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ABSTRACT

The aim of the Texas model articulation programs, commonly 2 years of postsecondary instruction. This "how-to" manual for 2+2 2 year of postsecondary instruction. This 'how-to" manual for 2+2 Agricultural Occupations provides secondary students with the opportunity to develop saleable skills upon completion of the first 2 years of competency-based curriculum. The curriculum includes occupationally specific courses, general academic courses, and workplace competencies. The first three sections outline the rationale behind the 2+2 program and the needs assessment that determined its curricula, and provide a list of the advisory committee members. Other sections deal with developing the curriculum; basic course outlines; instructor qualifications; program/curriculum; the makeup and selection of the 2+2 development and implementation staff; student follow-up, the articulation agreements process, and evaluation. Two appendices provide 2+2 user's group definitions and 2+2 agriculture curriculum examples. The 10 examples provided form half of this document; they are: sample duty and task list for agriculture 2+2 programs; description of the occupation and basic objective of the curriculum; secondary to postsecondary flowchart; recommended student prerequisites; sample basic agricultural course outlines; sample reference materials; sample line drawing of recommended facilities; sample tools and equipment; sample competency profile; and sample articulation agreement. (NLA)

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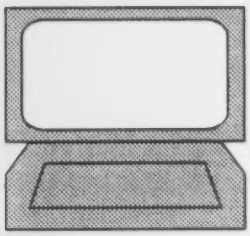

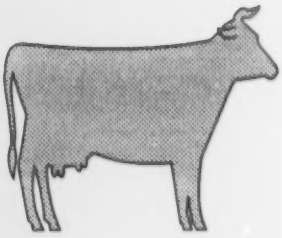

A How-To-Manual for Agricultural Occupations

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2 + 2
Secondary Postsecondary

Prepared by

Walter York

for

The
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in cooperation

with the

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A How-To-Manual for Agricultural Occupations

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I Introduction

The Texas Legislature has mandated the articulation of secondary and postsecondary vocational - technical programs. Yet, early articulation efforts met with limited success. Relatively few secondary students "transitioned" to postsecondary programs as a result of institutional articulation agreements.

To promote transition to secondary programs, the Texas Higher Education Coordinating Board (CB) and the Texas Education Agency "co-funded" a series of model articulation programs starting in 1982. In "The Forgotten Half", Dale Parnel had described in general terms the idea of a four-year articulated curriculum spanning secondary and postsecondary levels. Since Parnel's articulation model involved two years of secondary and two years of postsecondary education, Parnel used the term "2+2" to describe it. While the Texas model programs were to link the last two years of secondary with the first two years of postsecondary instruction, the model programs were not limited to Dr. Parnel's model. Nevertheless the model programs and their resulting curricula are most commonly called "2+2".

Given the current emphasis for both increased accountability of agricultural technology education and reduced duplication of effort between secondary and postsecondary institutions, the concept of 2+2 is a valuable tool for building efficient and effective programs. Many agricultural technology educators see the concept of a 2+2 curriculum as a solution to an additional problem. As technology is increased and jobs are restructured, the knowledge and skill requirements of many jobs increase. How do community/junior colleges and technical institutes meet the increased workplace requirements within the maximum semester hours of college credit set for an Associate Degree? How do you teach more in the same amount of time?

The CB is advocating the use of a 2+2 curriculum to meet additional workforce requirements caused by increased use of technology and job restructuring. The CB has defined 2+2 programs as:

. . . integrated (general education, technical, and vocational), cooperatively developed, competency-based, four-year programs of study which begin in the junior year of high school and which lead to an advanced Associate in Applied Science degree. The curriculum is designed to provide components which ensure competence in reading, writing, oral communication, fundamental mathematical skills, and scientific principles, and to provide intensive technical and

vocational instruction which produces technical skills in the graduate beyond those obtained in traditional Associate in Applied Science degree programs and which maintains a standard of excellence.

The definition above originated from a 2+2 user's group created by the Texas Higher Education Coordinating Board. A major activity of the 2+2 user's group was the development of terminology and definitions. These additional definitions are presented in Appendix A.

The Agriculture Technologies 2+2 Model Project conducted by Northeast Texas Community College and the Daingerfield-Lone Star ISD recommended four common requirements for implementing local 2+2 articulated curricula for agriculture.

- The curriculum must provide secondary students with the opportunity to develop saleable skills upon completion of the first two years of the curriculum. (This requirement inspired the development of a career ladder curriculum.)

- The curriculum must be competency-based. Competency-based curricula have two common elements: (1) instructional content must be based on the competencies required in the workplace and (2) student achievement (mastery of competencies) must be performance measured.

- The curriculum must include both occupationally specific courses and supporting courses of science, math, communication, personal development, and management skills.

- The 2+2 articulated curriculum would include additional competencies required by the workplace which currently are not being attained by students (due to maximum credit hour requirements) in the regular Associate Degree program.

II Needs Assessment

Both secondary schools and two-year postsecondary institutions offering agricultural technology programs are required to document the need for new programs and the continuation of existing programs using labor market information. Also, both secondary schools and postsecondary institutions are required to maintain articulation of each program that is offered at both educational levels. To meet these two requirements, cooperative efforts are made by secondary and postsecondary institutions to continuously assess the training needs of employers. Two kinds of needs assessments are maintained. First is the needs assessment to determine the demand for new employees in the workplace. The second assessment is to determine the training requirements of new and existing jobs. As with the demand for new employees, the training requirements or competencies of the workplace are constantly changing. Changing workplace training requirements charge educators with expanding the curriculum to include new competencies created by new technology or job restructuring.

When a needs assessment reveals the demand for new employees and additional competencies which cannot be achieved by existing programs, there is a great potential for the successful implementation of a 2+2 articulated curriculum. The 2+2 articulated curriculum should be developed to meet the requirements of the workplace for a specific career area. The 2+2 articulated curriculum should be based on a career ladder for a progression of specific technical occupations. A career ladder approach provides a starting point for the curriculum developer. It identifies the occupations to be analyzed for labor market demand and for analysis of training requirements.

Using the career ladder approach in the development of a 2+2 articulated curriculum in agricultural occupations is beneficial to students and employers alike. For the students it provides an opportunity to exit and re-enter the program at specified occupational levels. For the employer it assures a better prepared employee with greater knowledge and skills.

Features of the 2+2 curriculum for agriculture technology related to needs assessment include:

- The curriculum provides for a career ladder leading to the occupation of manager, supervisor, or technician (paraprofessional)
- The curriculum provides for the development of advanced skills and knowledge (additional competencies).

- The curriculum provides for the supporting academic courses of math, science, and communication, personal, and management skills.

A 2+2 articulated curriculum is needed if a continuous assessment of occupational training needs and demand reveals:

- A career ladder with exit points for secondary and postsecondary graduates.
- A strong demand for at least occupations at the exit point for postsecondary graduates.
- Additional competencies required at the exit point for postsecondary graduates which cannot be acquired in the regular Associate of Applied Science Degree program.

A 2+2 articulated curriculum for a four-year program provides students an opportunity to develop employment entry level skills at the completion of the first two years of the program. In developing a 2+2 curriculum that culminates with the students earning an associate degree, the occupation for which the program is conducted would be at the top of the ladder. In the case of the 2+2 agriculture program, the manager, supervisor, or specialized technician will typically be at the top of the career ladder. The 2+2 program provides for exit points at different skill levels with the job benefits and types of skills performed appropriate with the levels of education attained. The jobs identified at each exit point are entry level jobs with promotion and benefit increases possible.

When it is determined that there is a need for a 2+2 articulated curriculum, a 2+2 Technical Advisory Committee should be created. The program planners of the secondary and postsecondary institutions in a Quality Work Force Planning region should cooperatively prepare a report of the needs assessment. The report, documenting the needs for a 2+2 articulated curriculum, should be submitted simultaneously to the superintendents and president of the cooperating institutions for approval to develop the needed 2+2. Immediately following the approval of the superintendent and president for jointly developing a 2+2 program, a technical advisory committee (TAC) should be created and used for the development of the curriculum and other components of the program.

An example of an agriculture career ladder is shown below:

Career Area: Dairy Products Management

EXIT LEVEL	JOB TITLE
Higher Education (Grade 16) Baccalaureate Degree	**Dairy Farm Manager** **Processing Plant Supervisor** **Dairy Sales Manager**
Postsecondary (Grade 14) Associate of Applied Science Degree	**Dairy Farm Assistant Manager** **Processing Plant Assistant Foreman** **Dairy Supply Salesman** **Dairy Products Salesman** **Dairy Route Driver**
Secondary (Grade 12)	**Dairy Farm Worker** **Processing Line Worker**

III 2+2 Technical Advisory Committee

Role

The 2+2 technical advisory committee will play a key role in the development of the 2+2 program. The committee's primary function will be in the area of instructional content for curriculum development. The 2+2 TAC should be used in the curriculum development phase to:

- Approve the validated competencies required of the workplace in the occupation(s) for which the articulated curriculum is to be developed.
- Approve the curriculum developed.
- Approve the content of basic course outlines developed for the approved curriculum.
- Approve the standards for determining mastery of each competency to be developed by the 2+2 program.
- Make recommendations for the development and administration of competency exams.

The 2+2 technical advisory committee may and will make other contributions to the development, installation, evaluation, and support of the 2+2 program.

Composition

It is assumed that local program advisory committees of the articulating community colleges and public secondary schools were involved in the assessments that identified the need for a 2+2 four-year articulated curriculum. Therefore, members of the existing program advisory committees may be requested to serve on the 2+2 TAC. The 2+2 technical advisory committee should be composed of individuals interested in agricultural technology education.

The following is a recommended roster of TAC membership:

- individuals who are presently supervising entry-level workers in occupations on the career ladder
- individuals who are presently performing as senior-level workers in the occupation(s) for which the curriculum is being developed
- an individual representing a state licensing agency and/or national accrediting agency for the occupations for which the curriculum is being developed if appropriate
- from participating secondary school(s)
  - one instructor
  - one administrator of vocational education
  - one career counselor

  (Note: Two or more school districts should be represented on the 2+2 Technical Advisory Committee)
- from participating postsecondary institution(s)
  - one instructor of the postsecondary program
  - one administrator of the postsecondary vocational/technical program
  - one career counselor

The members representing the private sector should comprise seventy-five percent of the 2+2 TAC (8 private sector, 3 secondary, 3 postsecondary). Since it would not be practical for representatives of the two state agencies (TEA and CB) to serve on all local 2+2 technical advisory committees, it is highly recommended that appropriate staff of both agencies be informed periodically of the progress of the 2+2 development.

Creation

The local program planners of agricultural technology programs should cooperatively develop a list of proposed 2+2 technical advisory committee members from the private sector and submit the list to their respective superintendent and president. The superintendent and president should jointly send written invitations to individuals in the private sector to serve on the committee. The

written invitation to serve should specify the date, time, and place of the first TAC meeting.

TAC Orientation

The first meeting of the TAC should be held for orienting the members to the purpose and procedures of developing the 2+2 program. At the orientation meeting the members should be made aware of the roles and responsibilities of each member of the committee. Also, at the orientation meeting, planners should discuss procedures for obtaining input from each of the committee members.

Use

As previously stated, the technical advisory committee should play a key role in the development of the curriculum and instructional content of the 2+2 program. The committee should only be convened at times when the program developers (local staff of cooperating institutions and consultants) have materials (i.e. competencies to be validated, proposed curriculum, basic course outlines) to be reviewed and approved by the committee membership. Each step or phase of the curriculum development process should be reviewed and approved by the TAC. Approvals will come quickly if the curriculum developers provide documentation for each product (by step or phase) that is submitted to the committee. Recommendations for improvement of products or processes made by the committee should be considered seriously by the project director. The finalized curriculum will include the following:

- A brief description of the occupation (Chapter IV, Example Page 57)
- The basic objective of the curriculum (Chapter IV, Example Page 57)
- A flow chart of recommended secondary and postsecondary course options (Chapter IV, Example Pages 59-62)
- Student prerequisites including academic courses (Chapter IV, Example Pages 63-68)
- Basic agricultural course outlines for grades 11-14 (Chapter V, Example Pages 69-80)
- A list of reference materials for secondary Agricultural Science courses (Chapter V, Example Pages 81-86)
- A line drawing of recommended facilities for secondary programs (Chapter V, Example Pages 87-88)

- A list of recommended tools/equipment and estimated costs for secondary programs (Chapter V, Example Pages 89-93)
- An occupational competency profile for grades 11-14 (Chapter V, Example Pages 94-101)
- An example of the student monitoring and follow-up system (Chapter V & IX)
- Teacher approval criteria (Chapter VI)
- A sample articulation agreement (Chapter X, Example Pages 102-104)

IV Developing the Curriculum

A. Occupational Analysis

As used here the term "curriculum" means a systematic group of courses or sequence of subjects required in an occupational area. Curricula for occupational preparation must be based on the occupational requirements of the workplace. Some forms of occupational analysis are very complex and must be performed by an individual trained in the science of analyzing occupations for training content. While an external consultant may be required, .local program planners often have the capacity to perform valid occupational analyses.

One procedure which is used to identify occupational or job requirements of the workplace is a process known as DACUM. "Developing A Curriculum" has emerged as an innovative and relatively new approach to occupational analysis. DACUM has been used to successfully analyze occupations for identifying the occupational requirements of the workplace. A "DACUM committee" identifies the specific duties and tasks performed by entry-level workers. The DACUM process takes about three days. If DACUM is to be successful, the committee members must work under the guidance of a trained and experienced DACUM facilitator.

Another process that may be used locally is the validation of previously identified duties and tasks. A procedure for accomplishing this process called TEXCOM was developed at Northeast Texas Community College. Texas System for Developing a Competency-Based Curriculum can be used to validate a task listing that has been obtained from public or private sources. Usually this process takes only one day of working with an "advisory panel" as opposed to three days with the DACUM process.

The TEXCOM process involves identifying the target occupation(s), selecting an occupational advisory panel, and using this panel to identify duties and tasks performed in the target occupation(s).

Two individuals are key to the TEXCOM process; the coordinator and the facilitator. The coordinator should be a local person who can make contact with local employers to obtain their participation. The facilitator may be a consultant skilled in facilitating TEXCOM panels. The responsibilities of the coordinator include:

- defining the occupations to be analyzed

- identifying businesses and industries that employ people in the targeted occupations
- determining the criteria to be used in selecting panel members
- visiting with business and industry to explain the TEXCOM process and obtain names of prospective panel members
- selecting panel members
- arranging for location and facilities for the TEXCOM workshop

The responsibilities of the facilitator include:

- calling the meeting to order and conducting introductions
- establishing rapport and creating a participatory atmosphere
- reviewing the general objectives of the workshop
- working with the panel to identify duties and tasks for the occupation

Identifying Target Occupations

Step one in the TEXCOM process is identifying target occupations for which your program prepares students to enter at the job-entry level. Careful consideration should be given to the appropriate scope of the target occupation. If an occupation is defined too narrowly, the student will have a restricted opportunity to compete for employment. Broadly defined occupations may require more training time than necessary and graduates could receive insufficient training to perform critical tasks. In the case of a 2+2 curriculum in agriculture, the occupations for both secondary and postsecondary graduates should be considered. The exit occupations for secondary students form the foundation of knowledge and skills for postsecondary exit occupations. In a properly conceived career ladder the top "rung" on the ladder may require considerable experience or a baccalaureate degree. The middle "rung" will often stress the target occupation. The occupational definition is used to determine who are the eligible participants for selection to the TEXCOM advisory panel; therefore, it is necessary to define the occupation as accurately as possible.

Various sources and documents are available to determine the target occupation for the advisory committee's deliberations. The Texas Employment Commission, Quality Work Force Planning Committees, and local advisory committees can help. The best single source of information is Vocational Preparation and Occupations, Third Edition, Volume I, National Occupational Information Coordinating Committee.

Selecting The Occupational Advisory Panel

Step two in the TEXCOM process is the selection of occupational advisory panel members. Job descriptions of the target occupation should guide the selection of panel members. Care should be exercised to select panel members who are the most competent and knowledgeable personnel available. Panel members should possess a knowledge of all aspects of work in the occupation. It is also important to select panel members capable of establishing a good working relationship with each other and the TEXCOM facilitator. The criteria for selecting advisory panel members include:

- All members should have performed a majority of the proposed tasks of the occupation as entry level workers.
- Less than one third should be presently supervising the performance tasks of entry level workers in the occupation.
- Non-supervisory members should be senior level workers who are presently performing tasks in the occupation.
- Supervisors and supervisees, from the same business, should not be allowed to serve together on the panel since this may restrict the supervisee's ability to communicate freely with the panel.
- All members must be willing to make a total commitment to the proposed effort.
- All members must have the ability to communicate effectively and work cooperatively as team members on the panel.
- All members must be free from bias and function open-mindedly concerning the proposed training program.

In assembling the panel, no attempt should be made to "weight" the committee with members who would bias the committee's deliberations. This includes recent graduates and instructors from the training programs, and upper level managers and personnel managers from business and industry. Such personnel lack sufficient task level knowledge of the occupation. It is also better not to include members of the local program advisory committee on the occupational advisory panel.

Working with Occupational Advisory Panels

At this point, the facilitator should have defined the occupations to be analyzed, identified business and industries that employ people in the targeted occupations, and determined the criteria to be used in the selection of members. The **third step** is for the facilitator to contact business

managers to enlist their aid in helping him locate prospective panel members. It is important for the facilitator to make appointments by phone to visit local business and industries personally to explain the TEXCOM process and request their cooperation in nominating and releasing one or more employees to serve as panel members.

The facilitator should go prepared to explain the TEXCOM process, how the results will be used, and the qualifications of the workers or supervisors needed. Experience has shown that it is beneficial to have a written summary of the TEXCOM process and the qualifications for panel members that can be left with the contact person. The main thrust of the visit should be to convince the personnel manager, supervisor, or other contact person that the school needs the company's help to update or establish a relevant educational or training program.

The contact person should be assured that one or more expert workers from the company or business is needed to specify the tasks that workers in that occupation perform in order to be successful. It should be pressed upon the representative that the results of the TEXCOM workshop will be used to develop a curriculum and instructional program that will produce skilled workers for that company and other employers in the community. Most companies will be more than willing to assist education in updating its programs; they realize the value of well trained employees.

The most effective strategy to obtain participants for a TEXCOM panel is to meet personally with each nominee, as arranged through the employer. The contact with the nominee should be made at least 30 days before the workshop. This personal contact can be used to convey to the member the importance of the meeting and the need for their services. In addition, the personal contact may be employed to overcome some ill feelings the member may have about the panel, especially if the boss ordered the employee to participate. The use of letters and phone calls alone should be avoided, unless the distances involved are too great for personal contact. After the meeting, a personal thank you note to each member would be in order. It is highly recommended that the facilitator make confirming phone calls to each participant five to ten days prior to the workshop. This provides the participant an opportunity to ask any question he/she may have and gives the facilitator time to replace those who may have had to cancel.

Preparing for the Occupational Advisory Panel Session

Step four in the TEXCOM process is to make preparation for the occupational advisory panel session. The workshop should be held in a location convenient to most of the advisory panel members. The room should be will lighted and large enough to accommodate groups of at least 20 people. The walls should be suitable for attaching large papers either by tape or sticky putty. The members should have the opportunity to work at tables and under no circumstances should student desks be used for this purpose. Each member should have a tag with personal name and

company name on it. It is appropriate to have coffee and other suitable refreshments available for the members.

Convening and Orienting the Panel

Step five of the TEXCOM process is to convene and orient the panel. The facilitator selected to work with the panel should assume the primary responsibilities at this point. The facilitator should call the meeting to order and review the general objectives of the TEXCOM workshop. The importance of each panel members' participation and collective contributions to the program concerning present and future student training should be stressed. The facilitator must at no time lead the panel in describing the occupations, duties, and tasks. In working with the panel the following operational guidelines should be followed:

- Everyone participates equally
- Ideas are freely shared
- Hitch-hike on each other's ideas
- Constructive suggestions rather than negative criticisms are provided
- All task statements should be carefully considered
- References are not required
- Observers cannot participate

Identifying Duty Fields for the Occupation

The identification of duty fields is the **sixth step** of the TEXCOM process and the first objective in conducting a job analysis to create a job inventory. A duty field is a major functional division of work and represents a logical and useful categorization of tasks. Duty fields are normally divided into six or more task statements which share common characteristics. There are two ways to identify duty fields. One is to identify the classes of objects and/or subsystems that the worker acts upon. The objects include items of a physical nature such as equipment, classes of people, or a series of reporting forms used in the work environment and involved in producing a usable product or service. Subsystems are a grouping of objects that work in a systematic and purposeful manner such as brake systems, feed handling systems, or greenhouse environmental control systems.

Another way to define duty fields is to identify the objects/subsystems that act upon the worker. Samples include performance appraisal, supervisors, budgets, time sheets, organizational rules,

and workloads. This approach is useful in occupations where task performance is "data and/or people" dependent and employees spend a lot of time working with ideas, data, and/or people. These occupations are dominated by paper work, data analysis, and/or person to person communications and relations. The following guidelines should be followed when identifying duties:

- The key factor in defining duty fields is to identify sets of work activities with tasks grouped together naturally to meet work objectives. This provides job inventory validity.
- Duty fields containing fewer than eight or ten tasks are easier to work with than those containing large numbers of tasks.
- Duty statements should not imply either a type of job within the occupational area or a job specialty within one occupation. Reviewers of a job inventory often neglect a duty field if the duty title represents a job other than their own. This can lead to incorrect data since there may be tasks in a duty field to which the reviewer should respond.
- The definition of duty fields for a job analysis is a continuing process that is subject to revision and modification as long as tasks are being discussed and defined by the panel.

Identifying Tasks from the Duty Fields

After establishing the duty fields, the panel is ready for **step seven**, to focus on delineating the tasks for each of the duty fields. A task may be defined as follows:

A task is a discrete unit of work performed by an incumbent worker on the job and:

- has a recognizable beginning and ending point.
- consists of two or more steps to be performed over a short period of time.
- results in a product, decision, or service.
- can be observed and measured.

Step seven, like that of identifying duty fields, is also primarily a brainstorming activity. This is the heart of the TEXCOM process. It is around these tasks that the instructional development phase of the instructional program will be structured.

A properly developed task statement should have a number of desirable characteristics in order to be an effective communication device. A working knowledge of these characteristics will help the facilitator and advisory panel create a valid job inventory. A task statement is written to:

- include a present tense verb at the beginning
- devise a meaningful unit of work
- include an object upon which the verb acts
- include the language used in the target occupations
- be clear, concise, and stand alone
- include no abbreviations
- include no qualifying phrases such as "When appropriate", "As required", "Proper", or "Correct use of". These types of qualifying phrases are understood.

The following describes what should be avoided in writing task statements:

- Avoid the use of double action verbs such as, "Inspect and turn brake drums".
- Avoid statements concerning the knowledge needed or worker traits and attitudes.
- Avoid the use of unnecessary, vague, and flowery modifiers such as correctly, accurately, etc.
- Avoid including more than one task to a statement.
- Avoid referencing tools and equipment that merely support task performance.

A well written task statement will convey the same meaning to anyone having reasonable knowledge of the target occupation. If a completed list of task statements is comprehensive, any worker in the target occupation should recognize the duties and tasks as being descriptive of their job.

B. Task Analysis

Instructional material developers for occupational preparation programs should analyze each of the validated tasks of an occupation for instructional content. This process is known as task analysis. The purpose of a task analysis is to sort out the knowledge, skills, and abilities critical to successful job performance at the task level. The task analysis creates the base of information from which competency-based education training is designed and developed. The objective of a task analysis is to produce information that will enable the curriculum developer to create a competency-based learning system for the target occupations. The purpose of the resulting information is to answer some basic questions in curriculum development. The process should

start with the least difficult duties by taking each task and producing:

- basic information for developing instructional objectives.
- detailed information regarding the steps required to perform a task.
- standards of step performance that lead to the development of performance measurements and test items.
- knowledge elements necessary for task performance.
- equipment and material requirements.
- safety requirements.

A sample task analysis form appears on the page following this section. To complete the task analysis form, the following information is needed:

- Analyst: The name of the analyst and date of analysis should be recorded.
- Conditions: What must be available in the workplace for the worker to perform the task.
- Performance: The performance is usually a restatement of the task.
- Standards: How are the end results of a task evaluated to determine if the task has been performed satisfactorily.
- Steps: Incremental activities which complete a task.
- Decisions: Moment by moment assessments made by workers to determine if the process is being performed correctly.
- Cues: Indications the student must observe to determine if the process is proceeding correctly.
- Safety: Required safety considerations.
- Equipment, Etc.: The equipment, tools, materials, etc., required to perform the task should be listed here.
- Critical Knowledge: The critical knowledge required of the performer should be listed in this space.

The form on the next page provides an example of a handy worksheet for recording the findings of the task analysis.

TASK ANALYSIS FORM

DUTY: _____

TASK: _____

APPROVAL SIGNATURES	
PROGRAM:	
ANALYST:	
COMPANY REP.	
DATE:	
EXPECTED JOB MASTERY	
TASK LEARNING DIFFICULTY	
EXPECTED JOB SUPERVISION	
FREQUENCY OF PERFORMANCE	

CONDITIONS	PERFORMANCE	STANDARDS

STEPS	DECISIONS	CUES	SAFETY

TOOLS, EQUIPMENT, MATERIALS, SUPPLIES	CRITICAL KNOWLEDGE (TERMS, FACTS, RULES, ETC.)

Each task will be an instructional topic and may be taught as a single lesson. The task should be written in behavioral terms for instructional purposes. This is covered in Chapter V of this manual. Further review of the task analysis may reveal that the mastery of the task by the learner requires a considerable amount of enabling knowledge. In such cases instruction of the task may require more than one lesson. A review of the information on a completed task analysis form will provide a good indication of the instructional time required for the learner to master the task being taught.

After the instructional time is estimated for each task, the curriculum developer may cluster the tasks into courses. The tasks should be clustered for the course by instructional sequence and within the number of clock hours allocated to the course by semester or year. All of the courses are sequenced to complete the occupationally specific courses of the curriculum.

Agricultural Technologies curriculum must include the application of the basic academic skills in the development of the occupational competencies of the curriculum. Occupational competency is an educational term that equates to the industry term of tasks. Basic skills include computation skills, reading skills, writing skills, and oral communication skills. The application of these basic skills in occupational instruction reinforces and increases proficiency in the basic skills in academic courses as well.

Each task identified must be analyzed for both occupational and basic academic skills. The critical knowledge identified on the task analysis form should be used to help identify these skills. At the present time no process exists to accomplish this analysis in more detail. More work is needed to analyze academic skills for each task in more detail. Once occupational and academic skills that meet the needs of the workplace are identified, coordination and collaboration between academic and occupational faculty must be maintained. Only by working together for the benefit of the student can educators provide a technically literate workforce that will be successful in global competition.

C. Student Prerequisites

A local secondary student prerequisite that should be developed to comply with the requirement of House Bill 72, Article VI, Part H, Section 1, (n) which states: "....

> each district enrolling a student in a vocational program shall consider the suitability of established curricula for the student and the adequacy of the student's academic preparation for admission to a particular vocational curriculum."

The critical knowledge portion of the task analysis form may be used to help identify if the student is academically prepared for admission to the agriculture 2+2 program.

Student prerequisites at the postsecondary level should include: (1) prerequisites of all students entering the postsecondary institution and (2) completion of the secondary level courses of the 2+2 curriculum. Note: Completion of all of the secondary level courses does not mean that a student has mastered all of the competencies taught at the secondary level. Provision must be made for the student to master all secondary level competencies prior to continuing in the 2+2 program at the postsecondary level. This provision must be included in the articulation agreement. For example, students may be required to make a certain score on a secondary exit test that covers the competencies taught at the secondary level. Those who do not may be required to take remedial courses at the postsecondary institution in order to prepare them for postsecondary instruction.

D. Support Courses

The instructor of occupational specific preparation courses does not have time to teach all the cognitive skills essential for the learner to master the occupational specific content. Academic courses, and sometimes courses specific to another occupation, which support and assist the student in learning the occupational specific content must be included in the curriculum of the occupational preparation programs. The support courses can be identified by a review of the results of the analysis of the validated tasks which constitute the occupational specific courses of the curriculum.

E. Course Prerequisites

A review of the results of the analysis of each task will identify the academic skills the learner must have in order to understand and benefit from instruction. A listing of these academic skills will identify the non-occupational course prerequisites for enrolling in the program or an individual course of the program. Academic course prerequisites do not preclude the application of basic skills in Agricultural Science courses.

V Basic Course Outlines

As generally used the term "course of study" means an organized body of instructional content necessary for teaching a particular subject. It is different from a curriculum because a curriculum includes a list of all the courses (of study) offered over a long period of time and required for mastery of a specified subject (e.g.. agricultural technology, automotive technology) at an institutional level. A course of study should not be confused with a basic course outline. A course of study is a detailed plan of instruction which includes lesson plans, references, grading systems, and class management procedures. A basic course outline, which is more detailed than a topical course outline should include as a minimum:

- Name of Program (curriculum)
- Objectives of the course
- A list of competencies to be developed by the course stated in performance terms
- Instructional Topics (task statements written as objectives in performance terms)
- Lists of suggested learning activities
- Lists of tools, equipment, and materials when appropriate
- References
- Procedures for evaluation of student progress
- Competency profiles and suggested criteria for measuring mastery of competencies

The main advantages of a course outline are:

- It is easier to prepare than a course of study.
- It serves as a guide for developing a course of study.
- It gives the supervisor, other administrators, and members of the program advisory committee an immediate overall view of the course.

- It becomes documentation for the administrators who wish to keep on file outlines of all courses.
- It will serve as a guide for the instructor in assuring that the competencies of the course are covered.

Both the Texas Higher Education Coordinating Board and the Texas Education Agency have specified that sponsored developmental 2+2 programs be competency-based. Therefore, it is necessary that the basic course outlines be developed to meet the competency-based specifications. Competency-based education is not a method or procedure for the delivery of instruction. Competency-based education is a system for ensuring that (1) what is taught is based on the competency requirements of the workplace and (2) the student achievement is measured using performance criteria of the workplace.

"Generalized" differences between competency-based education and traditional education are shown in the chart below:

Educational Component	Competency-Based Education	Traditional Education
1. Focus	Student learning	Teaching
2. Time Frame	Variable	Fixed
3. Objectives	Designed for students, parents, prospective employees	Designed for the instructor
4. Instructional Content	Based on occupational analysis	Based on textbook content and teacher experience
5. Instructional Methods	Individualized; based on objectives, student learning styles/needs, and research on effective teaching	Group oriented and sequenced; may be based on objectives, textbook, and teacher experience
6. Starting Point of Instruction	Varies, depending upon students' abilities, knowledge, entry status	Same point for all students
7. Evaluation	Performance measured	Norm-referenced; A students performance is compared to performance of other students in the class

The instructional delivery methods or learning activities will be selected by the instructor. The competency-based system does have specific characteristics that are related to instructional methodology. One of the characteristics of competency-based education is that the student is informed prior to instruction of (1) the competency to be mastered; (2) the conditions under which the competency will be performed; and (3) the criteria to be used in measuring the performance. How it is taught is up to the instructor. CBE simply states that one must evaluate students in terms of whether or not they can perform the task to employer standards.

A. Objectives

The formulation of objectives for the basic course outline will be helpful in identifying the conditions that will prevail when the competency or task is demonstrated by the student for evaluation purposes. Following is an example of how the objectives may be sequenced in relation to preparing the basic course outline.

Sequencing of Objectives	Comparable Competency-Based Educational Occupational Analysis Terms
Competency (Duty)	Terminal Performance Objective
Task	Performance Objective
Learning Activities	Enabling Objectives

The enabling objectives may be written as a lesson objective or only as complete statements of a skill, knowledge, or attitude necessary for the student to learn and successfully demonstrate performance of the task.

Performance objectives are written for the competencies or tasks that are to be developed by the course. A performance objective may be defined as: **A statement in precise measurable terms of a particular behavior to be exhibited by a learner under specified conditions. It contains each of the characteristics specified below:**

- Condition. The environment or situation in which the competency or task is to be performed is specified. (tools, equipment, facilities, materials, etc.)

- Performance. The specific competency, task, or behavior expected of the learner is stated.

- Standard. The degree of acceptable performance is specified. The standard is stated in quantitative terms, qualitative terms, or both. For the terminal performance objective (competency) or performance objective (task) the standard will be 100% of the evaluation criteria as established by the workplace.

In occupations requiring a high level of theory, enabling objectives may be written in performance terms. Enabling objectives are lesson activities or learning experiences necessary for students to know in order to perform tasks. If the enabling objective is written in performance terms then 100 percent demonstration is assumed, otherwise the standard is specifically stated as "75%", "90%", etc.

One of the most helpful guides in identifying and defining performance objectives is Bloom's Taxonomy of Educational Objectives. The three categories of this taxonomy include:

- Cognitive Domain - those objectives which emphasize intellectual outcomes, such as knowledge, understanding, and thinking skills.

- Psychomotor Domain - those objectives that emphasize manipulative skills, such as operating equipment, using tools, and demonstrating a procedure.

- Affective Domain - those objectives that emphasize feeling and emotion, such as interest, attitudes, appreciation and other values an individual internalizes.

Technical occupations often require a high proportion of theory (cognitive domain) for each skill (psychomotor domain) to be performed. When learning in the cognitive domain is greater than that of the psychomotor domain it is appropriate to include the cognitive instruction with the performance objectives rather than including them as enabling objectives. There are no hard and fast rules. Practical objectives in terms of instruction are good objectives. Instruction rarely mimics the workplace exactly in agricultural science.

Whether the performance objective is for the cognitive domain or the psychomotor domain the following points should be observed when writing performance objectives:

- Use the competency or task statement as the base for the performance objective.

- Include a condition, performance, and standard statement in each performance objective. These should have been developed using the worksheet during the task analysis.

- Include only one performance in the objective.

- Write standards which are measurable.

- Include only those conditions which are essential to the performance and can be provided during the evaluation.

- Use an action verb that specifies the performance level to be demonstrated.

B. Learning Activities/Events

A 2+2 competency-based articulated curriculum requires a variety of instructional methods. Instruction may be delivered to a large group, small group, or individual student. The instructional methods used depend on the course content, student population, facilities, instructor's ability, and the availability of appropriate instructional materials.

The competency to be developed and mastered by the student must serve as the basis for identifying and developing the learning activities. When writing learning activities for the basic course outline, the writer must keep in mind the sequence in which the learning activities are to occur. The following example of a sequencing scheme was taken from the Performance-Based Teacher Education project conducted by the Center for Employment and Training, Ohio State University, Columbus, Ohio.

Terminal Performance Objective (competency)

Performance Objectives (tasks)

Enabling Objectives:

Learning Activity

An example of this sequencing scheme is found on page 30. The performance objectives are the tasks stated in behavioral (performance) terms. The enabling objectives (required learning activities) were identified by the analysis of each of the tasks of the competency. Each enabling objective or learning activity may require a different teaching or instructional method. The most appropriate instructional method, for each enabling objective, should be listed in the basic course outline. Following are brief descriptions of instructional methods proven successful in agricultural technology education.

- Lecture and Laboratory. The course content is divided into a series of competencies or units of instruction. Group discussions and lectures provide content involving cognitive skills and information concerning job procedures, safety, and techniques. The psychomotor or application of skills is taught in the laboratory or shop. Students progress through the program as a group. Some independent and individualized instruction may be used.

- Learning Activity Packages (LAP). The LAP system of instruction divides the course content into a series of individual learning packages which include one or more competencies. The learning activity package usually contains a pretest, performance objective(s), learning activities, self-checks, and a post-test. Students progress at their own rate, and instruction can be tailored to fit individual needs. LAP may also be used in a group instruction format.

- Competency Sheets. A method which assists the instructor in organizing learning and evaluation activities. The following information may be included on Competency Sheets: (1) competency statement, (2) performance objective, (3) enabling objectives, (4) learning experiences/activities, (5) evaluation techniques, and (6) criterion-referenced materials. The Competency Sheets assist the instructor in providing individualized programs for students. The Competency Sheet will also provide the student with a "self-check" prior to taking a competency exam.

- Task or Operation Sheets. A method of instruction which provides specific information for the student on how to complete a task or skill required in the vocational program. Competencies requiring "hands on" skills usually are taught in the laboratory environment, and a task sheet facilitates this type of instruction. Task sheets may include (1) task or skill to be performed, (2) material required, (3) tools and equipment needed, (4) procedure or operations, (5) safety considerations, and (6) evaluation information. Normally, task sheets are used with other methods of instruction in vocational programs.

- Modules. A self-contained unit or package including information, learning activities, and evaluation required to learn a specific competency or unit of instruction. Modules allow for self-pacing and individualization of programs. A vocational program using modules or self-contained packages as the major instructional method is referred to as a "modularized" course.

- Programmed Instruction. An auto-instructional method in which subject matter is arranged into a series of small steps. Cognitive information is structured into a series of frames or steps with answers. The student works through the program by responding to the questions. Immediate feedback and reinforcement is provided to the students. Program booklets are either "linear" or "branched", depending on the subject matter and complexity of the programs.

- Individualized Learning. A method which assesses the student prior to learning and adjusts the program to fit the student's needs. A variety of learning materials and methods are used to meet individualized learning styles. Self-pacing and the use of modules or learning activity packages usually are in individualized vocational programs. Because individualized instruction varies among programs and educators do not agree on definitions, there may be other characteristics of individualized learning to consider.

- Simulations. A technique which uses role-playing models to teach competencies that are required in real-life situations. Various types of simulations are available including: games, tasks, and positions (jobs). This instructional method serves as a motivational device and assists students in developing a sense of responsibility toward work. In other words, simulations enable the student to experience situations which are required in the real world environment.

A lesson plan should be developed for each of the enabling objectives listed in the basic course outline. There are exceptions. Where learning activity packages, modularized instruction, or programmed instruction are used, no lesson plan is required. Remember a variety of methods is needed to be effective. The lesson plan is actually a road map for the student and teacher in providing detailed information concerning content, learning activities, procedures, materials required, references, presentation techniques, and evaluation procedures. The plan is valuable also to the vocational supervisor and administrator in evaluating the programs and providing assistance to the teacher. Lesson plans are designed and developed to provide:

- Organization and coordination of instructional content.
- Presentation of a logical sequence to instruction.
- A listing of instructional materials and aids.
- A basis for program planning and evaluation.
- Teacher analysis and content planning prior to instruction.
- A record of actual course content and emphasis.

A sample lesson plan form is shown on the following page.

LESSON PLAN FORM

COURSE TITLE:

Unit:

Terminal Performance Objective:

Enabling Objective(s):

Teaching methods:

( ) Lecture

( ) Laboratory (Shop)

( ) Audio-visual

( ) Demonstration

References Needed:

Equipment/Supplies Needed:

Evaluation Method:

( ) Performance Test

( ) Knowledge Test

Competency:	**Terminal Performance Objective:**
Producing Forages	Given a plot of land, tillage equipment, planting equipment, spraying equipment, harvesting equipment, storage facilities, seed, fertilizer, and chemicals, the student will plant, manage, harvest, and store a forage crop.
Task #1:	**Performance Objective # 1:**
Prepare The Seedbed	Given a plot of land, chisel plow, cultipacker, disc, harrow, moldboard plow, and tractor, the student will prepare a seedbed that is free of foreign objects, smooth, and firm within the restrictions of available moisture.
Critical Knowledge:	**Enabling Objectives:**
Tractor Operation, Equipment Adjustment	The student must know how to safely operate and maintain a tractor. The student must know how to adjust, maintain, and operate tillage equipment.
	Learning Activity # 1:
	1. Adjust and grease equipment. 2. Turn under all organic matter. 3. Remove stones or excess trash from the field. 4. Pulverize the soil into small (but not fine) particles. 5. Smooth the seedbed.
Task #2:	**Performance Objective # 2:**
Plant Forages	Given a broadcast Seeder, cultipacker, grain drill, grass seeder, harrow, knife, no-till seeder, tractor, tub, seed, fertilizer, and prepared seedbed, the student will plant a forage crop at the specified depth, time, and rate according to variety and species specifications.
Critical Knowledge:	**Enabling Objectives:**
Tractor Operation, Equipment Adjustment	The student must know how to safely operate and maintain a tractor. The student must know how to adjust, maintain, and operate planting equipment.
	Learning Activity # 2:
	1. Determine the species, variety, and amount of seed needed. 2. Adjust the planting equipment. 3. Prepare the seed a. apply lubricant b. apply innoculant c. mix with nurse or companion crop seed 4. Plant seed at specified depth.

C. Tools and Equipment

Tools and equipment for the instructional program must be comparable to that of the workplace. The list of tools and equipment needed for the course(s) was developed during task analysis. Each enabling objective should also include the listing of tools, equipment, and supplies required to complete that objective. They can be compiled to create a list of required tools and equipment.

A list of tools and equipment prepared for the course or program should be approved by the program advisory committee. Also the tools and equipment may exceed those required by licensing or certification agencies. A complete list should be compiled to assure that the tools and equipment are available when needed.

D. Physical Facilities

Adequate physical facilities must be available for the instructional program. A line drawing should be prepared for the physical facility. The line drawing and specifications of the physical facility should be approved by the appropriate state education agency. Equity and special population accommodation should be considered in planning physical facilities. In the case of a 2+2 programs, both the Texas Education Agency and the Texas Higher Education Coordinating Board should approve the physical facility. Examples of line drawings for the 2+2 agricultural program are shown in Appendix B.

E. Instructional Materials

The basic course outline should serve as a guide for the development of a complete course of study, course syllabus, and lesson plans. It is necessary that examples of instructional materials be listed in the basic course outline with a bibliography at the end of the outline. Since the developers of the basic course outlines will list only the materials with which they are most familiar, it is paramount that instructors using the basic course outlines search all available sources before deciding on materials to be used.

There are numerous curriculum material development centers which offer a variety of curriculum materials such as task lists, learning activity packages, transparencies, competency sheets, task sheets, information sheets, and testing materials. The Instructional Materials Service (IMS) at Texas A&M University offers the most complete and up-to-date curriculum materials for Agricultural Technology. IMS re-sells only high quality materials from all available sources. Following is a partial listing of organizations that should be contacted to obtain an instructional materials catalog:

American Association for Vocational Instructional Materials
745 Gaines School Road
Athens, Georgia 30605

American Vocational Association
Dept. RC98
1410 King Street
Alexandria, Virginia 22314

Creative Education Video
5147-A 69th Street
P.O. Box 65265
Lubbock, Texas 79464-5265

Curriculum and Instructional Materials Center
State Department of Vocational and Technical Education
1500 West Seventh Avenue
Stillwater, Oklahoma 74074-4364

Doane Information Services
11701 Borman Drive
St. Louis, Missouri 63146

Hobar Publications
1234 Tiller Lane
St. Paul, Minnesota 55112

Instructional Materials Laboratory
University of Missouri - Columbia
2316 Industrial Drive
Columbia, Missouri 65202

Instructional Materials Laboratory
The Ohio State University
1885 Neil Avenue
Colombus, Ohio 43210

Instructional Materials Service
Texas A&M University
F.E. Box 2588
College Station, Texas 77843

Iowa Association for Vocational Instructional Materials
208 Davidson Hall
Iowa State University
Ames, Iowa 50010

Midwest Ag Business Services, Inc.
4565 Highway 33 West
West Bend, Wisconsin 53095-9108

Nasco
Dept. AC-896
Ft. Atkinson, Wisconsin 73538

National FFA Supply Service
5632 Mt. Vernon Memorial Highway
P.O. Box 15160
Alexandria, Virginia 22309-0160

Vernard Films LTD
P.O. Box 1332
Peoria, Illinois 61654

A network of clearinghouses has been established by the National Institute of Education to collect, select, and catalog educational materials and literature. The Educational Resource Information Center (ERIC) network provides both hard copies and film copies of cataloged documents. Instructors and administrators should check with their local librarians for additional information concerning ERIC services and materials. The following clearinghouses have been established:

ERIC Clearinghouse in Career Education
The Center for Vocational Education
The Ohio State University
1960 Kenny Road
Colombus, Ohio 43210

ERIC Clearinghouse for Reading and Communication Skills
National Council of Teachers on English
1111 Kenyon Road
Urbana, Illinois 61801

ERIC Clearinghouse on Adult Education and Lifelong Learning
204 Gabel Hall
Northern Illinois University
DeKalb, Illinois 60115

ERIC Clearinghouse on Rural Education and Small Schools
New Mexico State University
Box 3AP
Las Cruces, New Mexico 87003

ERIC Clearinghouse on Early Childhood Education
College of Education
University of Illinois
805 West Pennsylvania Avenue
Urbana, Illinois 61801

ERIC Clearinghouse on Science, Mathematics, & Environmental Education
The Ohio State University
1800 Cannon Drive
400 Lincoln Tower
Colombus, Ohio 43210

ERIC Clearinghouse on Educational Management
University of Oregon
Eugene, Oregon 97403

ERIC Clearinghouse for Social Studies Social Science Education
855 Broadway Street
Boulder, Colorado 80302

ERIC Clearinghouse on Handicapped and Gifted Children
Council for Exceptional Children
1920 Association Drive
Reston, Virginia 22091

ERIC Clearinghouse on Teacher Education
American Association of Colleges for Teacher Education
One Dupont Circle, Suite 616
Washington, D.C. 20036

ERIC Clearinghouse on Higher Education
George Washington University
One Dupont Circle, Suite 630
Washington, D.C. 20036

ERIC Clearinghouse on Tests, Measurements, and Evaluation
Educational Testing Service
Princeton, New Jersey 08540

ERIC Clearinghouse on Information Resources
Stanford University School of Education
Center for Research and Development in Teaching
Stanford, California 94305

ERIC Clearinghouse on Urban Education
Colombia University, Teachers College
Box 40
525 West 120th Street
New York, New York 10027

Educational Resources Information
Center Central Office
National Institute of Education
Washington, D.C. 20208

ERIC Processing & Reference Facility
4833 Rugby Avenue, Suite 303
Bethesda, Maryland 20014

ERIC Clearinghouse for Junior Colleges
University of California
Powell Library, Room 96
405 Hilgard Avenue
Los Angeles, California 90024

ERIC Clearinghouse on Language and Linguistics
Center for Applied Linguistics
1611 North Kent Street
Arlington, Virginia 22209

ERIC Document Reproduction Service
P.O. Box 190
Arlington, Virginia 22210

The U.S. Department of Education has established a nationwide network of curriculum management centers for collecting and sharing curriculum development information and materials. The purpose of this management system is to eliminate the costly duplication of effort in curriculum development.

The network is divided into regions and advisory committees meet periodically to discuss curriculum activities and the development of products:

Northeast Curriculum Coordination
Bureau of Occupational Research
Division of Vocational Education
225 West State
Trenton, New Jersey 08625

Southeast Curriculum Coordination Center
Mississippi State University
Research and Curriculum Unit
Drawer JW
Mississippi State, Mississippi 39762

East Central Curriculum Management Center
Illinois Vocational Curriculum Center
Sangamon State University
Springfield, Illinois 62708

Midwest Curriculum Coordination Center
Oklahoma State Department of Vocational and Technical Education
1515 West 6th Avenue
Stillwater, Oklahoma 74074

Northwestern Curriculum Coordination Center
Washington State Coordination Connell
222 Airdustrial Park/Box 17
Olympia, Washington 98504

Western Curriculum Coordination Center
Vocational Education Section
Department of Education
721 Capital Mall
Sacramento, California 95814

F. Competency Profiles

Competency profiles communicate to employers what students can do. A competency profile should be used to present graphically the competencies mastered in an agricultural science program by an individual student. The competency profile should be designed to display a student's competency achievement or mastery rather than a student's progress in terms of time. In addition to serving as a record of achievement at the secondary or postsecondary institution, the competency profile should serve the potential employer with a documented list of competencies mastered by the student. There are numerous competency profile models and formats available for agriscience programs. Therefore, it is suggested that developers of competency-based education programs determine the purpose of the competency profile. The following questions should be considered in using a competency profile:

- Is the competency profile to serve as a record of the competencies mastered by the student which will be reviewed by potential employers?
- Will the profile be reviewed by the appropriate staff of the postsecondary institution to determine the student's achievement in the curriculum?
- Will the competency profile be used to determine the progress of a student in a specific course?
- Will the competency profile include a record of both competencies and tasks mastered?
- Will the competency profile be used to record mastery of competencies for a course or to complete a 2+2 curriculum (program)?
- Will the format or the size of the competency profile be compatible with the present filing and record systems?

In reference to the examination of student instructional needs in relation to the state's occupational and skill requirements the current Texas State Plan for Federal Vocational Education Funding states in Section 1.19; "These competency profiles are derived from a task listing of the occupation for which training is offered, validated by representatives of the appropriate business or industry".

One of the competency profiles developed for the agriculture 2+2 program is shown in Appendix B.

G. Student Monitoring

Student monitoring as related to instruction is a process of assessing and recording student progress in a specific course or curriculum. In a true competency-based education program, (open entry - open exit without time limitations) a student does not fail. The indicators of progress are incomplete and complete.

Public schools and colleges provide instruction in semester time periods. Semester hour credit is awarded based on the number of clock hours of instruction provided. Individuals who do not achieve at a minimum rate during the semester are failed. This system prevents the use of a true competency profile for a daily, weekly, or semester monitoring of a student's progress. Even students who fail typically make some progress.

Local boards (public schools and colleges) establish the grading system of each institution. Therefore, any system for monitoring student progress in competency attainment must be converted to a grade to meet local requirements. While competency profiles communicate well to employers, they do not fit the framework of existing educational institutions.

Monitoring the daily, monthly, or semester progress of a student may be done using a variety of methods or techniques. Methods of monitoring student progress include measuring achievement of daily assignments, projects, periodic tests, semester exams, etc. Each of these methods are usually recorded by the assignment of a grade representing the degree of the student's progress or achievement.

In addition, many vocational and technical education instructors use a student progress chart or profile that graphically presents the students progress to the student and instructor. The progress chart used in vocational and technical education was probably the prototype of what is now called a competency profile. The progress chart, similar in format to a competency profile, includes each task or performance objective of the course. As the semester progresses, each student completes required performance objectives. The date on which the performance objectives are achieved is recorded in the progress chart. The progress chart is not to be used as a grade record but as a graphic presentation to the instructor and student of the student's progress in terms of competency achievement.

Since grading cannot be based on the mastery of competencies alone in the public education system, each school or college implementing a competency-based education system must develop a local student monitoring and reporting system. Teachers are over burdened with paper work. Therefore a monitoring system is needed that will convert the competency profile into the traditional grading format used by most public educational institutions.

The system that was selected to aid in monitoring the agriculture 2+2 students is the System 2001. System 2001 is a computerized instructional management system developed to help

instructors implement traditional and competency-based education. Experience has shown that implementing CBE increases the testing and record keeping workloads of instructors. Computerizing instructional management is the most cost-efficient means for handling these testing and record keeping workloads.

System 2001 consists of two modules. The first, known as the instructional management module, is used to track and report student mastery of competencies and tasks assigned to courses. The second is a test item banking module for use in storing test items and creating tests for defined tasks and competencies. Both modules work interactively to support total instruction and test management needs of instructors and students.

H. Performance Exams

Competency-based occupational instruction must be performance measured. Evaluation of a students' achievement must be criterion referenced with a student's performance being measured and evaluated by predetermined criteria or standards. Mastery of competencies must be evaluated using criteria predetermined by a performance level equal to that required by new employees in a specified occupation. The tasks which constitute the terminal competencies should also be performance measured.

A criterion-referenced testing procedure must be established for each instructional performance objective (competency or task). There must be a test item statement of how the testing will be conducted for each competency specified in the curriculum.

Curriculum material centers are developing test-item banks and other competency performance exams may currently be available. The National Occupational Competency Testing Institute at Ferris State University in Big Rapids, Michigan, has a variety of occupational competency exams for purchase.

If the competency and performance exams cannot be obtained from the curriculum material centers, then one must be developed for each competency and task. In writing the competency or task exams, the following steps should be observed.

- Study the performance objective which was written for the competency to determine specifically what performance is to be measured.
- Identify the standards or criteria which are used to evaluate the performance. Selected standards should be approved by members of the technical advisory committee.
- Determine the environment, equipment, materials, etc. which will be required to perform the competency.

- Develop a set of instructions to be observed by the student in taking the exam.
- Identify the individuals, and or qualifications of the individual(s) who will be responsible for administering the exam and rating the performance of the student.
- Write instructions and prepare rating sheets to be used by the examiner, or
- Prepare paper and pencil test items and test directions for each task.

When all of the steps have been completed the competency exam is ready for field testing.

VI Instructor Qualifications

In most cases the development and implementation of a 2+2 (secondary to postsecondary) technical program will not require a change in the qualification and certification of instructors at the respective levels. It is recommended that instructors involved in the agriculture 2+2 program have the following qualifications:

- The instructors should have a valid Texas Teacher Certificate with Agricultural Science and Technology certification.
- The instructor should have attended workshops related to the area of instruction as approved by the Texas Education Agency.
- While not absolutely necessary, it is highly recommended that the instructor have taught within the last three years at the time of implementation of the 2+2 program or be a recent graduate (within the last 12 months) of an approved agricultural education program from a Texas college or university.

VII Program/Curriculum Accreditation

Any new occupational curriculum is of little value to a public education institution if it has not been approved by the respective regulatory state agency. If the occupation requires a license, certificate, or accreditation, the curriculum is of little value if approval of the licensing, certification, or accrediting agency or organization has not been received.

When convenient, a representative of all certifying agencies or organizations must approve the new curriculum and should be involved during the development of the instructional program. After the curriculum is developed it should be validated through implementation. Approval to validate the curriculum, without penalty to the students, must be obtained from the regulatory agencies and organizations.

The approval for the validation should be extended to all public education institutions that desire to implement the new 2+2 articulated curriculum.

VIII 2+2 Development and Implementation Staff

A. Curriculum Staff

The staff and consultants for the development of the curriculum and related materials (including competency exams) must be carefully selected. In recent years, the role of the vocational curriculum developers has become more complex, yet often individuals with expertise in the area of curriculum and instructional materials development have not been prepared by education. Rather, they have emerged as a result of experience and self-study.

The 2+2 curriculum development staff should consist of a coordinator, and writers supported by a highly qualified and dedicated occupational/technical committee. The coordinator of the 2+2 curriculum project should be experienced in the development of 2+2 articulated curricula. Secondly, he or she must possess management and leadership skills in the educational community. Third, the coordinator should be experienced in curriculum development. Fourth, the individual should have experience as an instructor and/or practitioner in the occupation(s) for which the curriculum is to be developed.

The writers (staff and consultants) must be experienced as instructors and/or practitioners in the occupation(s) for which the curriculum is being developed. The writers must also exhibit experience or educational preparation in curriculum development and/or be willing to participate in training designed to facilitate the writing of curriculum and related instructional materials.

In developing the agriculture 2+2 program, the curriculum materials center for agriculture in Texas was contacted concerning the above mentioned prerequisites. The staff and management of the Instructional Materials Service Center at Texas A&M University met the qualifications that are listed on the previous page. NTCC has many instructors who are qualified as well.

B. Implementation Staff

Staff members of both the secondary and postsecondary levels involved in the implementation of the 2+2 curriculum should include: (1) the instructional administrator for the campus; (2) the vocational/technical administrator; (3) counselors; and (4) the specified curriculum instructors.

The success and effectiveness of the curriculum will be dependent upon the understanding and support of all the staff positions listed above. Therefore, it is imperative that all staff members listed above be provided suitable in-service training on the design and intent of the curriculum. All staff members must become actively involved in their role of conducting and evaluating the curriculum.

In-service training activities should be scheduled to include participation of: (1) all staff at secondary and postsecondary levels; (2) staff by job classification or assignment at both levels; (3) all staff by educational grade level; and (4) program advisory committee members.

IX Student Follow-up

Extensive follow-up data on agricultural technology education students is needed for program evaluation. Data obtained from follow-up reports of students participating in agricultural technology education programs has been utilized in the evaluation of these programs for more than forty years. Follow-up data has been employed to determine performance of agricultural technology education programs. In most cases follow-up information has been generated only for completers and leavers of a program.

Follow-up data will also be important to the evaluation of a 2+2 curriculum. Data obtained in the follow-up of 2+2 students must include information other than that related to employment and satisfaction with training and employment. Follow-up data on leavers of agriculture 2+2 programs must include information on why the student left the program as well as the educational or employment status of the student after leaving the program.

Texas Education Agency and the Texas Higher Education Coordinating Board officials have determined that the present system for conducting follow-up of all vocational/technical students is appropriate for the 2+2 student. The only difference in procedure requires that records of 2+2 participants, by 2+2 program, be transferred from the secondary school to the postsecondary institution.

The Texas Education Agency has included space and instructions on its reporting forms to record enrollment and follow-up information on 2+2 students. It is assumed that the reporting system of the Coordinating Board will be modified in the near future to obtain data on 2+2 students and programs. Both the system and the data elements for conducting follow-up of all vocational/technical education students should be revised with the passage of legislation for the reauthorization of the Carl D. Perkins Act.

X Articulation Agreements

In Texas articulation between secondary and postsecondary occupationally specific programs is mandatory for new vocational programs. This articulation was mandated by the Texas legislature in an attempt to reduce duplication of effort. Articulation efforts should be enhanced by the identification of statewide competencies for occupational specific courses. Once the state-wide competencies are identified and/or formulated they can be used to establish a common linkage between secondary and postsecondary programs. Articulation agreements will then be developed and signed which describe: (1) how the attainment of these competencies will be verified and certified at the secondary level and (2) how credit at the postsecondary level will be awarded for competency attainment from the secondary level. The purpose and process for articulating secondary and postsecondary agricultural technology programs should affect the smooth transition of a students' learning from investigation to technical competence.

The process and the secondary purpose of articulation agreements for 2+2 programs are different from that of articulating programs. The curriculum of the 2+2 program is articulated during the process of developing the curriculum.

The 2+2 curriculum should contain statewide competencies of the occupation(s) for which the program was developed. The 2+2 curriculum, as described in previous chapters, will include procedures to verify and certify that attainment of the competencies at the secondary and postsecondary level are met. Since the curriculum for the 2+2 program provides for a sequencing of courses, secondary programs will not be duplicated at the postsecondary level in the 2+2 program. Therefore, with few exceptions the articulation agreements between the postsecondary institution and the secondary institutions adopting the 2+2 curriculum will be different from agreements for the articulation of programs. Basically the articulation agreements for the 2+2 program will be a contract by which the participating institutions agree to implement and support the curriculum as written. Future modifications of the curriculum would require the approval of the Texas Education Agency, the Texas Higher Education Coordinating Board, and in the case of some occupations the approval of the respective state licensing or certification agency.

One exception to an articulation agreement could occur when the postsecondary institution is unable to conduct the postsecondary level component of the 2+2 program while concurrently conducting a regular postsecondary program. The regular postsecondary program would enroll students that had not participated in the 2+2 program at the secondary level. It is recommended, if this exception occurs, that technical assistance be obtained from the Texas Education Agency

and the Texas Higher Education Coordinating Board at a joint meeting to develop the articulation agreement.

Another exception may occur when a 2+2 student has completed the high school level courses but has not mastered all of the competencies of the secondary level curriculum. In this case, the articulation agreement must make a provision for the mastery of the competency (s) prior to the student continuing in the 2+2 curriculum. A sample articulation agreement is found in Appendix B.

XI Evaluation

The evaluation of all vocational/technical programs and activities is mandated at both the state and federal levels. State level mandates for evaluation of vocational/technical programs are emphasized under the "sunset provisions." State and local systems for evaluation of vocational/technical programs will be greatly revised under the provisions of the reauthorization of the Carl D. Perkins Act. It is not appropriate, at this time, to describe an evaluation system which should be used for determining the effectiveness of 2+2 programs.

The present evaluation systems used by the two state educational agencies will suffice in the interim if the following recommendations are accepted: (1) the product standards at the secondary level (students employed, students continuing with occupational preparation) be given equal weight in the evaluation; (2) both the secondary and postsecondary institutions be involved when a 2+2 program is being evaluated; and (3) the final evaluation of the 2+2 program is completed no less than four and one-half years after the implementation of the program.

Appendix A
2+2 User's Group Definitions

2+2 User's Group Definitions

ARTICULATION

A planned process linking two or more programs, educational institutions, or services that facilitates the movement of students from one educational level to the next higher level, in order to eliminate delays or unnecessary duplication of instruction. Examples of articulation include: advanced placement and other time-shortened methods, 2+2 tech prep programs, and 2+2+2 programs.

ASSOCIATE IN APPLIED SCIENCE DEGREE

The degree awarded to students who complete occupational curriculums of collegiate level and character.

(Texas Higher Education Coordinating Board Rules and regulations, Chapter 5, Subchapter A, Section 5.1, Degree Terminology states:

> (b) The Associate in Applied Science degree and the Associate in Applied Arts degree are technical certificates issued to students who complete occupational curriculums of collegiate level and character.
>
> (c) The term "Applied" in an associate degree name is the distinguishing characteristic of the technical certificate of collegiate rank.)

ASSOCIATE IN APPLIED SCIENCE DEGREE (with Tech Prep designation)

The degree awarded to a graduate of a four-year 2+2 tech prep advanced program of study which begins in the junior year of high school and terminates with an advanced Associate in Applied Science degree from community colleges and technical institutes and which produces technical skills in the graduate beyond those obtained in traditional Associate in Applied Science degree programs.

ADVANCED PLACEMENT

Any agreement or plan between educational institutions, or any other method of recognition of student achievement, that enables secondary students or students in higher education to receive credit for or bypass courses in a higher education program, thereby shortening the time to complete a higher education program.

COMPETENCY-BASED EDUCATION

(As defined for technical and vocational programs)

An educational program designed to teach clusters of skills, knowledge, and attitudes which an individual will utilize in an occupation, the mastery of which forms the basis upon which the student is evaluated.

- Input from business and industry and the public and private sectors determine job competencies and the level of performance required for successful employment.
- Technical, applied academic and general education courses in the program have clearly stated, measurable performance competencies; learning activities are designed to enable the student to successfully achieve and perform each competency.
- Technical, applied academic and general education courses are arranged so that the sequential mastery of course competencies leads to the satisfactory performance of identified competencies.

INVERTED DEGREE PLAN

Designed for the student with an Associate in Applied Science degree, this program of study integrates additional, upper-level technical or professional education and additional supporting general education coursework and leads to an applied baccalaureate degree.

(The Texas Higher Education Coordinating Board Rules and Regulations, Chapter 5, Subchapter A, Section 5.1 states:

(g) The Bachelor of Applied Arts and Sciences degree is a program for students who have completed a technical or vocational specialization. The degree program will complete institutional general education requirements and a professional component to add to the student's technical or vocational competence.)

(The Southern Association of Colleges and Schools, Criteria for Accreditation, Commission on Colleges, 1989 Edition, page 18 states:

> Articulation agreements for upper division study should be developed and periodically evaluated to ensure an equitable and efficient transfer of students. "Inverted", "two plus two", and similar programs must include an adequate amount of advanced coursework in the subject field.)

TECH PREP PROGRAM (2+2 PROGRAM)

An integrated (general education, technical, and vocational), cooperatively developed, competency-based , four-year programs of study which begin in the junior year of high school and which lead to an advanced Associate in Applied Science degree. The curriculum is designed to provide components which ensure competence in reading, writing, oral communication, fundamental mathematical skills, and scientific principles, and to provide intensive technical and vocational instruction which produces technical skills in the graduate beyond those obtained in traditional Associate in Applied Science degree programs and which maintains a standard of excellence.

2+2+2 PROGRAM

An extended program which expands the four-year advanced skills 2+2 tech prep program to include additional years of study beyond the advanced Associate in Applied Science degree and which leads to a baccalaureate degree.

Alternate definition: Educational progression which includes two years of technical education in high school, two years of advanced technical education leading to an Associate in Applied Science degree, and two years of additional professional education leading to a baccalaureate degree.

OCCUPATIONAL EDUCATION

Organized technical and vocational programs which are directly related to the preparation of individuals for paid or unpaid employment, or for additional preparation for a career requiring other than a baccalaureate or advanced degree.

Appendix B
Agriculture 2+2 Curriculum Examples

Sample Duty and Task List For Agriculture 2+2 Program

DAIRY PRODUCTS MANAGEMENT

DUTIES	TASKS									
A. MILKING, SANITIZING, AND MAINTAINING THE EQUIPMENT	1. Sanitize the milking system	2. Assemble milking equipment	3. Prep the cow for milking	4. Milk the cow with the milking machine	5. Monitor feed and milk cooling equipment	6. Clean the milking system	7. Maintain milking system			
B. MAINTAINING DAIRY HERD HEALTH	1. Identify ailments in order to obtain timely treatment	2. Administer medication and vaccinations	3. Sterilize tools and equipment	4. Store medicines/ chemicals	5. Control parasites	6. Take an animal's temperature	7. Perform in-barn mastitis test	8. Keep health records on dairy animals	9. Inventory medical and chemical supplies	10. Test milk for antibiotics
C. BREEDING	1. Examine & treat reproductive system for breeding	2. Detect heat	3. Artificially inseminate cows and heifers	4. Handmate cows and heifers	5. Manage Sires	6. Record breeding data	7. Store semen and maintain breeding supplies	8. Pregnancy test bred cows and heifers		
D. HANDLING AND CARING FOR MILKING HERDS ACCORDING TO PRODUCTION	1. Check udder health	2. Monitor eating and milk production	3. Sort cows into herds	4. Segregate incompatible animals	5. Dry off cows					
E. HANDLING AND CARING FOR THE DRY HERD	1. Manage dry cows	2. Assist with calving	3. Produce healthy newborn calves	4. Remove extra teats						
F. HANDLING AND CARING FOR THE REPLACEMENT HERD	1. Manage baby calves 0-8 weeks	2. Manage calves 200-500 pounds	3. Identify animals	4. Dehorn animals						
G. FORMULATING AND FEEDING RATIONS	1. Identify & regulate access to feedstuffs causing off-flavored milk		2. Classify feedstuffs to nutritive value	3. Calculate nutritional requirements for animals	4. Mix & test feed ingredients to meet animal & ration requirements		5. Weigh animals	6. Feed animals	7. Clean feed and water troughs	8. Provide adequate water
H. PRODUCING FORAGES	1. Design and follow a soil conservation plan	2. Prepare the seedbed	3. Plant forages	4. Control Diseases	5. Control Pests	6. Control Unwanted Plants	7. Determine harvest time and harvest forages	8. Store forages		

DAIRY PRODUCTS MANAGEMENT

DUTIES	TASKS									
I. OPERATING AND MAINTAINING NON-MILKING EQUIPMENT AND TOOLS	1. Remove or add ballast weights to tractors	2. Attach farm equipment to the drawbar	3. Operate equipment	4. Store equipment	5. Perform seasonal preventative maintenance	6. Perform daily pre-ventative maintenance on equipment	7. Replace universal joints	8. Maintain tires	9. Bleed diesel fuel systems	10. Change fuel filters
I. OPERATING AND MAINTAINING NON-MILKING EQUIP-MENT AND TOOLS	11. Change oil and oil filter	12. Flush and clean radiator	13. Replace thermostats	14. Replace radiator hoses	15. Install V-belts on pulleys	16. Install and adjust pulleys on motors	17. Install electric motor	18. Reverse electric motor	19. Service electric motors	20. Install and adjust roller chains
I. OPERATING AND MAINTAINING NON-MILKING EQUIP-MENT AND TOOLS	21. Install engine batteries	22. Service engine batteries	23. Service wheel or in-line bearings	24. Maintain tools	25. Adjust safety shields	26. Calibrate equipment				
J. MARKETING PRODUCTS AND ANIMALS	1. Market dairy animals/ products	2. Transport animals	3. Verify production records							
K. HANDLING AND DISPOSING OF ANIMAL WASTE	1. Manage and remove solid and liquid waste	2. Apply wastes to fields								
L. ASSIST IN SELECTING BREEDING ANIMALS	1. Cull animals	2. Select foundation stock	3. Select purchased and self-raised replacement stock	4. Select sires						
M. MAINTAINING BUILDINGS AND STRUCTURES	1. Construct and install doors	2. Hang sliding doors	3. Hang hinged doors	4. Paint wood surfaces	5. Paint metal surfaces	6. Apply creosote or other wood preserva-tives	7. Patch roofs	8. Install window panes	9. Weld metal using arc welder	10. Weld metal using oxy-acetylene unit
M. MAINTAINING BUILDINGS AND STRUCTURES	11. Cut metal using oxy-acetylene unit	12. Construct and maintain wooden fence	13. Construct and maintain wire fence	14. Construct and maintain electric fence	15. Construct and maintain gates	16. Hang Gates	17. Wire simple electric circuits	18. Connect electric switch	19. Connect lighting fixture	20. Attach plug and recep-tacle to electrical drop cord

DAIRY PRODUCTS MANAGEMENT

DUTIES	TASKS									
M. MAINTAINING BUILDINGS AND STRUCTURES	21. Replace fuses	22. Reset circuit breakers	23. Maintain a water system	24. Pour concrete floor	25. Construct block walls	26. Extinguish fires	27. Maintain ventilation equipment in dairy barns	28. Paint buildings		
N. MANAGING HAZARDOUS MATERIALS	1. Storing hazardous materials	2. Using hazardous materials	3. Disposing of hazardous materials	4. Managing dioxins						
O. MANAGING THE BUSINESS	1. Maintain health records on dairy animals	2. Inventory supplies	3. Maintain animal production records	4. Maintain pedigree records	5. Maintain equipment records	6. Maintain forage production records				
P. PREPARING FOR OWNERSHIP	1. Calculate interest costs	2. Formulate feasible repayment schedule	3. Prepare a cash flow budget for the dairy enterprise	4. Develop and negotiate a credit plan for the farm business	5. Calculate and record assets	6. Calculate and record liabilities	7. Calculate and record expenses	8. Calculate net income	9. Calculate amount of life insurance needed	10. Calculate and record depreciation
P. PREPARING FOR OWNERSHIP	11. Calculate and record net worth of farm businesses	12. Fill out income tax form: income or loss schedule	13. Fill out federal income tax capital gains or loss schedule	14. Fill out federal income tax investment credit schedule	15. Fill out federal income tax FICA schedule	16. Complete federal income tax form 1040	17. Hire workers	18. Dismiss workers	19. Develop a plan for amount of labor needed	20. Develop and assign work schedules
P. PREPARING FOR OWNERSHIP	21. Comply with employers legal requirements	22. Train employees	23. Develop written work agreements	24. Evaluate work performance	25. Develop production goals	26. Comply with industry production standards	27. Analyze trends in dairy product demand	28. Contract for professional management services	29. Develop plan for bestowing the estate	30. Calculate and record labor and management income
Q. STARTING UP HIGH-TEMPERATURE, SHORT-TIME PASTEURIZATION PROCESS	1. Inspect equipment prior to start-up	2. Adjust equipment for start-up	3. Prepare data recording equipment	4. Start up high-temperature, short-time pasteurization process						
R. PROCESSING HIGH-TEMPERATURE, SHORT-TIME PASTEURIZATION	1. Monitor pasteurization process	2. Adjust equipment for high-temperature, short-time processing		3. Record high-temperature, short-time processing data		4. Put product into storage tank				

DAIRY PRODUCTS MANAGEMENT

DUTIES	TASKS									
S. PERFORMING PRODUCT-TO-PRODUCT CHANGEOVER	1. Prepare lines and valves to bring new product to balance tank		2. Adjust equipment for product changeover	3. Complete product changeover process						
T. PERFORMING PRODUCT CHANGEOVER REQUIRING FLUSH-OUT	1. Operate lines following established sequence		2. Set recording data equipment for changeover/flush-out		3. Perform flush-out procedures	4. Inspect equipment for proper operation	5. Complete product changeover process			
U. SHUTTING DOWN HIGH-TEMPERATURE, SHORT-TIME PASTEURIZATION	1. Prepare high-temperature, short-time for shut-down		2. Shut down high-temperature, short-time system		3. Inspect recording data equipment					
V. CLEANING THE HIGH-TEMPERATURE, SHORT-TIME PASTEURIZER	1. Inspect and adjust equipment and lines for cleaning		2. Perform cleaning procedures							
W. APPLYING SAFETY PRACTICES	1. Comply with shop and equipment safety rules	2. Apply basic emergency first aid techniques	3. Complete accident report	4. Inspect work area and equipment for safe working environment		5. Use fire extinguisher	6. Correct safety hazards	7. Demonstrate cardiopulmonary resuscitation (CPR) techniques		
W. APPLYING SAFETY PRACTICES	8. Comply with safety requirements for working around automated systems		9. Participate in safety training program							

Description of the Occupation and Basic Objective of the Curriculum

JOB DESCRIPTION: DAIRY PRODUCTS MANAGER

The dairy products manager directs dairy production either independently or in conjunction with other managers pursuant to the objectives and policies of the employing company or individual.

Utilizes the management process to manage labor in a variety of dairy production settings. Collects data about employees, identifies specific training needs/problems, implements a plan of action, and evaluates outcomes of the initiated plan. Assists with the production and procedures according to company policy and customer preferences.

Ensures quality of dairy products by serving as a positive role model for employees supervised. Accepts responsibility in managing, supervising, and teaching employees the importance of product quality to the customer and to the success of the company.

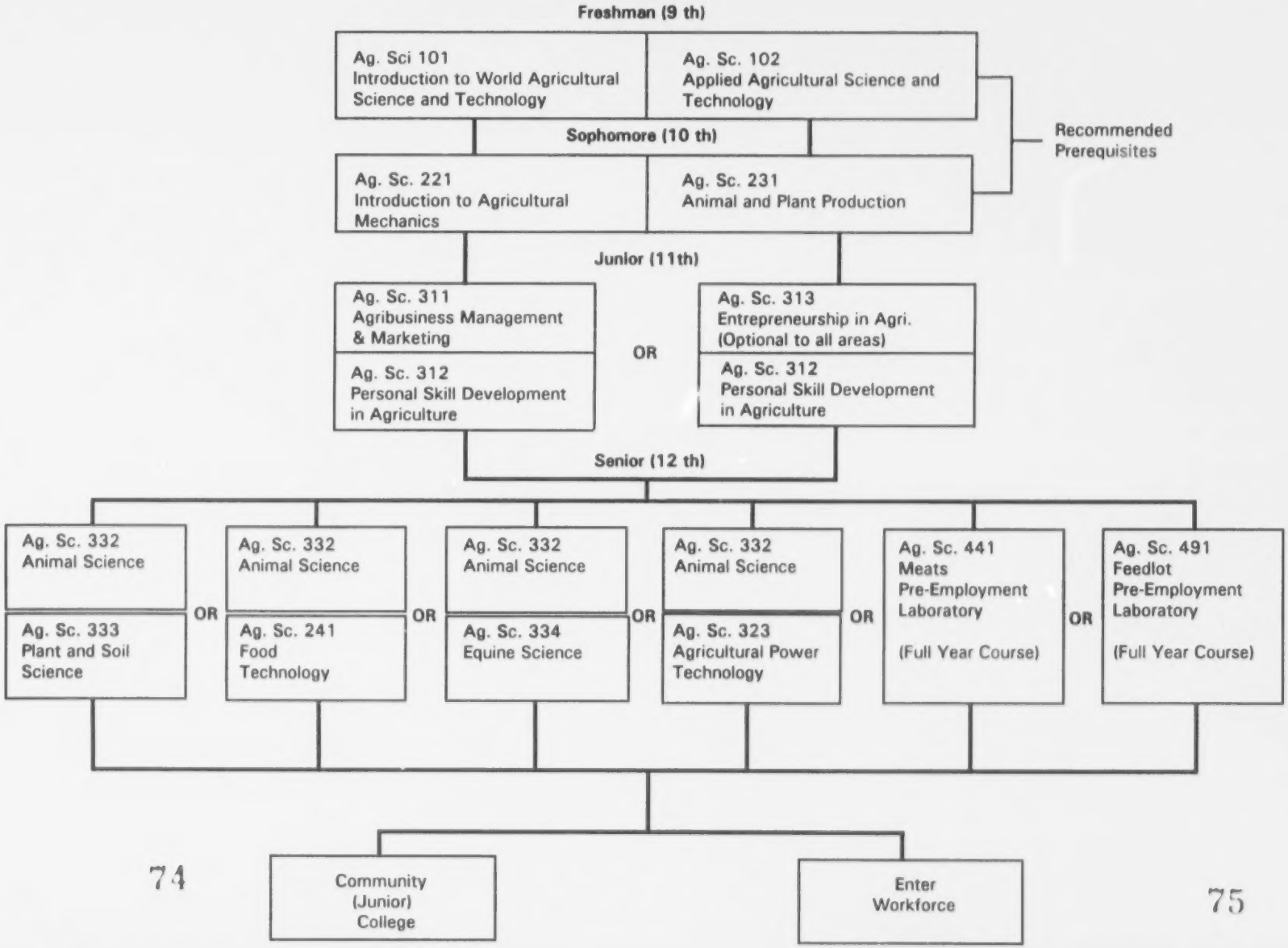
Performs duties on a tight schedule and must be capable of setting up and operating all equipment, operating on schedule, and maintaining sanitation and health practices to ensure a quality dairy product.

CURRICULUM OBJECTIVE

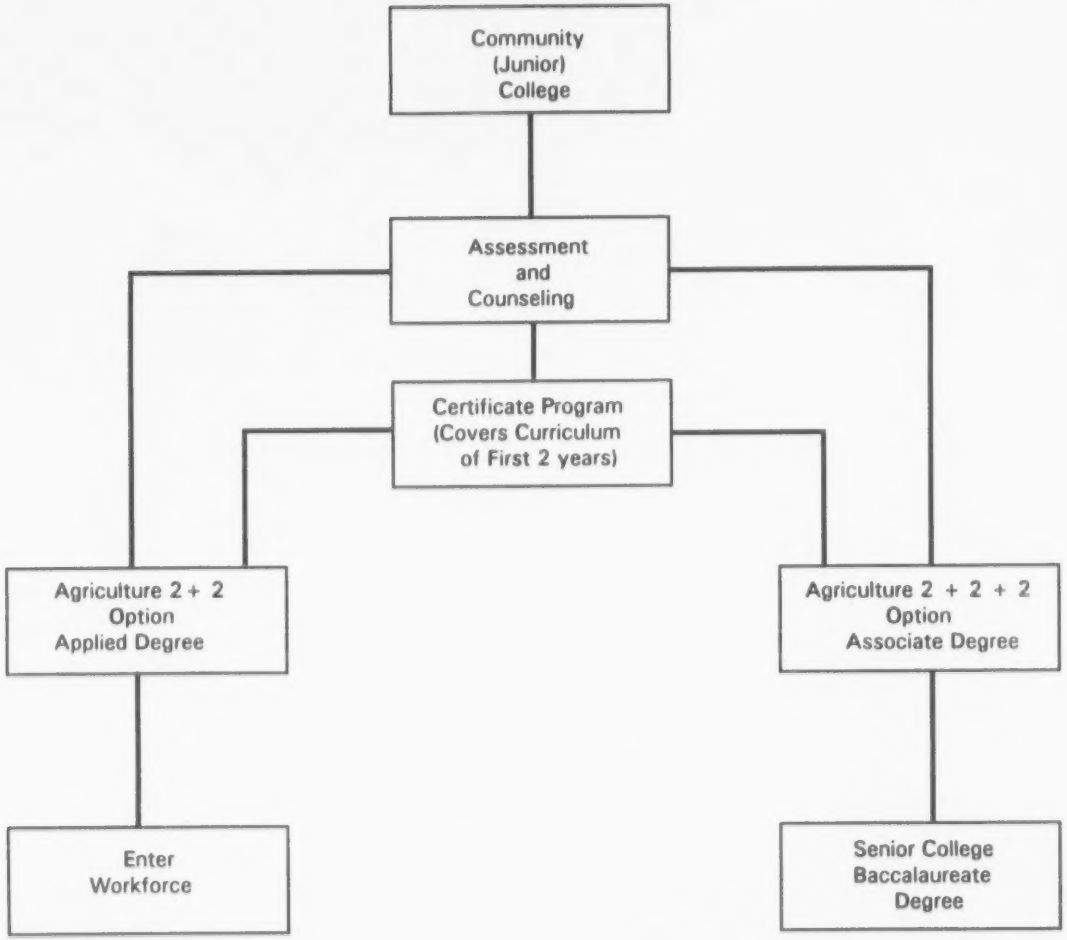
The curriculum is designed to produce an individual with skills, knowledge, and abilities sufficient to begin work as a dairy products manager in either the production or processing area of the dairy industry. The individual should perform safely and effectively in the position assigned to him by his employer. Graduates will be able to work independently or in a supervisory capacity.

Secondary to Postsecondary Flowchart

Agriculture 2 + 2 + 2
Animal Science Option



Agriculture 2 + 2 + 2
Animal Science Option
Continued



AGRICULTURE 2 + 2
Dairy Products Management Option
Northeast Texas Community College

Agriculture 2 + 2 Option Applied Degree	Certificate Program (Covers Curriculum of First Two Years)	Agriculture 2 + 2 + 2 Option Associate Degree
AGRI 1303 Animal Nutrition & Feeding	*AGRI 1101 The Agricultural Industry	*AGRI 1350 Computers in Agriculture
AGRI 1304 Animal & Poultry Health Management	AGRI 1313 Agricultural Mechanics	AGRI 1443 Agricultural Economics
*AGRI 1350 Computers in Agriculture	AGRI 1414 General Agronomy	AGRI 2363 Forage & Pasture Crops
AGRI 1443 Agricultural Economics	AGRI 1484 Introduction to Animal Science	*AGRI 2371 Dairy Science
AGRI 2308 Cooperative Education	AGRI 2386 Farm Buildings	FOOD 2400 Introductory Food Science
AGRI 2363 Forage & Pasture Crops		
*AGRI 2371 Dairy Science		
AGRI 2372 Dairy Management		
AGRI 2406 Genetics		
AGRI 2483 Reproductive Physiology		
FOOD 2313 Technology of Food Processing		
FOOD 2400 Introductory Food Science		

Students who do not enter the 2+2 program until after graduation from high school must complete the certificate program before they can continue with the postsecondary course work. They do have the option of testing out of any or all of these classes.

Students who do not score 80% or above on an exit level test that covers the secondary materials must also take the classes in which they failed to master the curriculum.

* These course outlines have not yet been developed.

Recommended Student Prerequisites for Secondary and Postsecondary

ARTICULATED CURRICULA FOR AGRISCIENCE TECHNOLOGY

Daingerfield High School Animal Technology Option (Dairy)

SUBJECT	HIGH SCHOOL			
	FRESHMAN	SOPHOMORE	JUNIOR	SENIOR
English	English I Regular or Honors *1	English II Regular or Honors *1	English III Regular or Honors *1	English IV Regular or Honors *1
Mathematics	Algebra I	Geometry	Algebra II	Pre-Calculus Honors *1
Science	Biology I	Physical Science	Chemistry I Regular or Honors *1	
Social Studies	United States History Reg. or Honors *1	World Geography	World History	U.S. Govt. & Free Enterprise
Physical Education	Physical Education / Health	Physical Education		
Agriculture Core	Ag. Sc. 101 Ag. Sc. 102			
Agriculture Core		Ag. Sc. 221 Ag. Sc. 231	Ag. Sc. 222 Optional	
Agriculture Specialty			Ag. Sc. 311 Ag. Sc. 312	Ag. Sc. 321 Ag. Sc. 323
Agriculture Specialty				Ag. Sc. 332 Ag. Sc. 333
Elective	F. A. or Rec. Elective *3	F. A. or Rec. Elective *3	Recommended Elective *4	
Elective			Recommended Elective *4	Computer Elective *2

*1. Students enrolled in the honors program would need to take at least 5 of these courses

*2. Computer course can be selected from the following:
Computer Math
Business Information Processing

*3. Fine Arts Elective can be selected from the following:
(1 credit required for honors and advanced)

Theatre Arts
Introductory Speech
Music History & Literature
Band I-IV (Fall counts for P.E. credit, Spring counts as Fine Arts credit)

*4. Recommended Electives can be selected from the following:

Journalism
Advanced Journalism

Spanish I
Spanish II *1
(Students in honors need to take these courses but regular students may also)

Personal Business Management
Typing I
Record Keeping
Accounting
Advanced Accounting
Introduction to Computer Programming
Psychology
Sociology

ARTICULATED CURRICULA FOR AGRISCIENCE TECHNOLOGY

Daingerfield High School Animal Technology Option (Dairy)

SUBJECT	HIGH SCHOOL FRESHMAN	SOPHOMORE	JUNIOR	SENIOR
English	English I Regular or Honors *1	English II Regular or Honors *1	English III Regular or Honors *1	English IV Regular or Honors *1
Mathematics	Algebra I	Geometry	Algebra II	Pre-Calculus Honors *1
Science	Biology I	Physical Science	Chemistry I Regular or Honors *1	
Social Studies	United States History Reg. or Honors *1	World Geography	World History	U.S. Govt. & Free Enterprise
Physical Education	Band I	Band II	Band III	Band IV
Agriculture Core	Ag. Sc. 101 Ag. Sc. 102			
Agriculture Core		Ag. Sc. 221 Ag. Sc. 231	Ag. Sc. 222 Optional	
Agriculture Specialty			Ag. Sc. 311 Ag. Sc. 312	Ag. Sc. 321 Ag. Sc. 323
Agriculture Specialty				Ag. Sc. 332 Ag. Sc. 333
Elective	F. A. or Rec. Elective *3	F. A. or Rec. Elective *3	Recommended Elective *4	
Elective	Health		Recommended Elective *4	Computer Elective *2

*1. Students enrolled in the honors program would need to take at least 5 of these courses

*2. Computer course can be selected from the following:
Computer Math
Business Information Processing

*3. Fine Arts Elective can be selected from the following:
(1 credit required for honors and advanced)

Theatre Arts
Introductory Speech
Music History & Literature
Band I-IV (Fall counts for P.E. credit, Spring counts as Fine Arts credit)

*4. Recommended Electives can be selected from the following:

Journalism
Advanced Journalism

Spanish I (Students in honors need to take these
Spanish II *1 courses but regular students may also)

Personal Business Management
Typing I
Record Keeping
Accounting
Advanced Accounting
Introduction to Computer Programming
Psychology
Sociology

ARTICULATED CURRICULA FOR AGRISCIENCE TECHNOLOGY

Daingerfield High School Animal Technology Option (Dairy)

SUBJECT	HIGH SCHOOL			
	FRESHMAN	SOPHOMORE	JUNIOR	SENIOR
English	English I Regular or Honors *1	English II Regular or Honors *1	English III Regular or Honors *1	English IV Regular or Honors *1
Mathematics	Algebra I	Geometry	Algebra II	Pre-Calculus Honors *1
Science	Biology I	Physical Science	Chemistry I Regular or Honors *1	
Social Studies	United States History Reg. or Honors *1	World Geography	World History	U.S. Govt. & Free Enterprise
Physical Education	Athletics	Athletics	Athletics	Athletics
Agriculture Core	Ag. Sc. 101 Ag. Sc. 102			
Agriculture Core		Ag. Sc. 221 Ag. Sc. 231	Ag. Sc. 222 Optional	
Agriculture Specialty			Ag. Sc. 311 Ag. Sc. 312	Ag. Sc. 321 Ag. Sc. 323
Agriculture Specialty				Ag. Sc. 332 Ag. Sc. 333
Elective	F. A. or Rec. Elective *3	F. A. or Rec. Elective *3	Recommended Elective *4	
Elective	Health		Recommended Elective *4	Computer Elective *2

*1. Students enrolled in the honors program would need to take at least 5 of these courses

*2. Computer course can be selected from the following:
Computer Math
Business Information Processing

*3. Fine Arts Elective can be selected from the following:
(1 credit required for honors and advanced)

Theatre Arts
Introductory Speech
Music History & Literature
Band I-IV (Fall counts for P.E. credit, Spring counts as Fine Arts credit)

*4. Recommended Electives can be selected from the following:

Journalism
Advanced Journalism

Spanish I
Spanish II *1
(Students in honors need to take these courses but regular students may also)

Personal Business Management
Typing I
Record Keeping
Accounting
Advanced Accounting
Introduction to Computer Programming
Psychology
Sociology

ARTICULATED CURRICULA FOR AGRISCIENCE TECHNOLOGY

Northeast Texas Community College Animal Technology Option - Associate of Science (Dairy Option)

	POSTSECONDARY			
SUBJECT	FRESHMAN A	FRESHMAN B	SOPHOMORE A	SOPHOMORE B
English	ENGL 1301 3	ENGL 1302 3	ENGL Lit. Elec. 3	SPCH 1301 3
Mathematics	MATH 1311 3			
Science	BIOL 1401 4	BIOL 1402 4		
Science		CHEM 1406 4	CHEM 1407 4	
Social Studies	HIST 1301 3	HIST 1302 3	GOVT 2301 3	GOVT 2302 3
Physical Education			HPER 1	HPER 1
Agriculture Core	AGRI 2371 3		AGRI 1443 3	AGRI 2363 3
Agriculture Specialty			AGRI 1350 3	Food 2400 4
Agriculture Specialty				
Elective		COMP 1301 3		Hum. Elect. 3
Total Hours	16	17	17	17

<u>Basics</u>

ENGL 1301 - English Composition I
ENGL 1302 - English Composition II
ENGL 2311, 2312, 2314, or 2315 Literature
SPCH 1301 - Fundamentals of Speech
MATH 1311 - College Algebra
MATH 1319 - College Trigonometry
CHEM 1406 - General Chemistry I
CHEM 1407 - General Chemistry II
COMP 1301 - Introduction to Computer Science
BIOL 1401 - General Biology (Botany)
BIOL 1402 - General Biology (Zoology)
HIST 1301 - History of the United States to 1877
HIST 1302 - History of the United States since 1877
GOVT 2301 - American National Government
GOVT 2302 - State and Local Government
HPER - Physical Education Activities
Humanities 1301 - Introduction to Humanities

<u>Agriculture Course Offerings</u>

Agri. 1350 - Computers in Agriculture
Agri. 1443 - Agricultural Economics
Agri. 2363 - Forage and Pasture Crops
Agri. 2371 - Dairy Science
Food 2400 - Introductory Food Science

Additional Courses Recommended If Time Allows:

Food 2313 - Technology of Food Processing

ARTICULATED CURRICULA FOR AGRISCIENCE TECHNOLOGY

Northeast Texas Community College Animal Technology Option - Associate of Applied Science (Dairy Option)

	POSTSECONDARY			
SUBJECT	FRESHMAN A	FRESHMAN B	SOPHOMORE A	SOPHOMORE B
English	ENGL 1301 3	SPCH 1301 3		
Mathematics		MATH 1305 3		BUAD 1301 3
Science	BIOL 1401 4	BIOL 1402 4		
Social Studies	HIST 1301 3			
Agriculture Core		AGRI 1303 3	AGRI 1304 3	
Agriculture Core	Food 2400 4	AGRI 2406 4	AGRI 2363 3	
Agriculture Core			Food 2313 3	AGRI 2483 4
Agriculture Specialty			AGRI 2371 3	AGRI 2308 4
Agriculture Specialty			AGRI 2372 3	AGRI 1443 3
Elective	COMP 1301 3		AGRI 1350 3	Hum. Elect. 3
Total Hours	17	17	18	17

<u>Basics</u>

ENGL 1301 - English Composition I
SPCH 1301 - Fundamentals of Speech
MATH 1305 - Intermediate Algebra
BUAD 1301 - Introduction to Business
BIOL 1401 - General Biology (Botany)
BIOL 1402 - General Biology (Zoology)
COMP 1301 - Introduction to Computer Science
HIST 1301 - History of the United States to 1877
Humanities 1301 - Introduction to Humanities

<u>Agriculture Course Offerings</u>

1303 - Animal Nutrition and Feeding
1304 - Animal and Poultry Health Management
1350 - Computers in Agriculture
1443 - Agricultural Economics
2308 - Cooperative Education
2363 - Forage and Pasture Crops
2371 - Dairy Science
2372 - Dairy Management
2406 - Principles of Genetics
2483 - Reproductive Physiology
Food 2313 - Technology of Food Processing
Food 2400 - Introductory Food Science

Sample Basic Agricultural Course Outlines for Secondary and Postsecondary

Agriscience 241 - Food Technology

A. Determine Trends in World Food Production

1. Determine Trends in World Populations
2. Determine Trends in Supply and Demand of Food Products

B. Understand the Nutritive Value of Food Constituents

1. Determine the Nutritive Value of Basic Food Groups
2. Determine the Energy Value and Calorie Levels of Food Constituents

C. Identify Procedures and Government Regulations Involved in Sanitation in the Food Industry

1. Outline Federal and State Inspection Standards for the Food Industry
2. Explain the Control of Insects and Rodents in the Food Industry
3. Discuss the Use of Chemicals for Sanitation in the Food Industry
4. Understand Public Health Regulations

D. Describe Methods of Preparing Livestock Carcasses for the Cooler

1. Explain Methods of Handling Livestock at the Processing Plant
2. Describe Slaughtering Procedures of Beef, Pork, and Lamb

E. Analyze Methods of Inspecting and Grading Meats

1. Identify Methods of Inspecting Beef, Pork, and Lamb Carcasses
2. Analyze USDA Grades of Beef
3. Analyze USDA Grades of Pork
4. Analyze USDA Grades of Lamb

F. Identify Methods of Fabricating Meats

1. Identify the Wholesale and Retail Cuts of Beef
2. Identify the Wholesale and Retail Cuts of Pork
3. Identify the Wholesale and Retail Cuts of Lamb
4. Discuss the Preparation of Various Processed Meats

G. Identify Methods of Processing Poultry

1. Explain the Process of Slaughtering Poultry
2. Analyze USDA Grades and Inspection Procedures of Dressed Poultry
3. Identify the Retail Cuts and Value-Added Products of Poultry

H. Identify Methods of Processing Fish

1. Recognize Various Classes of Fish and Seafood
2. Identify Processes of Washing, Scaling, and Gutting Fish
3. Identify Processes of Skinning, Filleting, and Other Methods of Fabricating Fish
4. Determine the Quality of Fish
5. Recognize Methods of Preparing Specialty Fish and Seafood Items

I. Describe the Methods of Preserving and Storing Meats

1. Explain Methods of Preserving Meat, Poultry, and Fish
2. Discuss Methods of Wrapping, Packaging, and Labeling Meat, Poultry, and Fish
3. Describe Methods of Refrigerating and Freezing Meat, Poultry, and Fish

J. Discuss the Processing of By-Products of the Meat Industry

1. Discuss the Fabrication of Edible By-Products of Livestock, Poultry, and Fish
2. Identify Inedible By-Products of the Meat Industry

K. Explain the Preparation of Eggs for Market

1. Explain the Storing and Handling of Eggs
2. Grade Exterior, Interior, and Broken-out Eggs
3. Explain the Processing, Packaging, and Marketing of Eggs

L. Describe the Processing, Packaging, and Quality Testing of Milk and Dairy Products for Distribution

1. Explain the Procedures in Sampling, Collecting, Transporting, Receiving, and Storing Raw Milk
2. Describe the Methods of Cleaning and Sanitizing Dairy Equipment and Containers
3. Determine Milk Quality
4. Describe the Processes of Clarification, Filtration, Separation, and Standardization of Milk
5. Describe the Processes of Pasteurization, Vacuumization, Homogenization, and Refrigeration of Milk
6. Describe the Processes of Packaging, Labeling, Dating, and Distributing Milk and Other Dairy Products

M. Describe the Processing of Other Dairy Products

1. Describe the Process of Making Cultured and Acidified Milk Products
2. Describe the Process of Cheese Manufacturing
3. Classify and Grade Cheeses
4. Discuss the Processes Involved in the Preparation of Frozen Deserts from Milk
5. Discuss the Process of Making Butter
6. Identify Procedures Involved in the Preparation of Concentrated and Dried Milk Products

N. Compare the Methods of Processing Various Forms of Fruits, Nuts, and Vegetables

1. Explain the Transporting, Receiving, and Storing of Fruits, Vegetables, and Nuts
2. Describe the Classifying and Grading of Fruits and Vegetables
3. Explain the Washing and Trimming of Fruits and Vegetables
4. Describe the Peeling, Cutting, and Blanching of Fruits and Vegetables
5. Discuss the Mechanical and Chemical Preservation of Fruits and Vegetables
6. Describe the Grading and Shelling of Nuts
7. Compare the Packaging, Freezing, and Storing of Fruits, Vegetables, and Nuts

O. Recognize the Procedures Involved in the Marketing of Food Products

1. Identify Wholesale and Retail Markets and Marketing Procedures for Food Products
2. Recognize Methods of Pricing and Labeling Various Food Products
3. Prepare and Maintain Displays of Food Products
4. Discuss Methods of Monitoring Quality and Minimizing Waste of Various Perishable Food Products
5. Explain Methods of Maintaining Stocking Levels of Food Products
6. Explore the Role of Convenience Foods in Consumer Preference

P. Explore Career Opportunities in Food Science Technology

1. Conduct a Career Self-Analysis
2. Identify Career Opportunities in Food Science Technology

Q. Plan and Conduct Leadership Activities Related to Food Technology

1. Develop Life Skills for Effective Leadership
2. Practice Leadership Skills for Food Science Technology

R. Manage Records in the Food Science Industry

1. Maintain Records in the Food Science Industry
2. Analyze Records in the Food Science Industry

Agriscience 312 - Personal Skill Development in Agriculture

A. Discuss Personal Development

1. Develop a Positive Self Concept
2. Develop Social Skills
3. Project a Professional Image

B. Describe an Effective Leader

1. Determine the Traits of a Good Leader
2. Contrast Leadership Styles

C. Develop Leadership Ability

1. Realize Personal Leadership Potential
2. Understand Basic Human Needs
3. Motivating and Influence People
4. Prepare Resumes and Applications

D. Describe Employee Responsibilities

1. Prepare for Job Interviews
2. Describe Employer Expectations
3. Recognize the Importance of Work Related Ethics
4. Get Along with Co-Workers

E. Describe Employer Responsibilities

1. Evaluate Job Applicants
2. Evaluate Employee Performance
3. Develop an Effective Complaint and Appeals Procedure
4. Recognize Employer Responsibilities
5. Recognize the Importance of Business Related Ethics

F. Develop Communications with Groups and Individuals

1. Improve Written Communications
2. Improve Verbal Communications
3. Improve Non-Verbal Communications
4. Participate in Group Discussions
5. Conduct a Successful Meeting
6. Work with Diverse Groups
7. Remove Barriers to Communication
8. Listen Effectively
9. Make Friends

G. Demonstrate Group and Individual Efficiency

1. Develop a Program of Work
2. Organize Groups
3. Establish Personal Goals
4. Manage Time
5. Make Decisions
6. Solve Problems

Agriculture 2372
Dairy Management

Course Objectives

Upon successful completion of the course the student will be able to:

1. Develop terminology useful for discussing dairy and dairy products.
2. Design dairy buildings appropriate for farm enterprises.
3. Design dairy premises that are environmentally sound.
4. Describe the role of animal behavior in dairy cattle.
5. Provide knowledge of feeding programs for livestock.
6. Understand the role of milk in the market place.
7. Develop strategies for marketing dairy cattle and dairy products.
8. Acquire a dairyman's knowledge of animal health, disease prevention, and parasite control.
9. Develop a knowledge of the role of government subsidies in dairy production.
10. Develop knowledge of the role of forages, silage, and concentrates in dairy production.
11. Obtain basis for steps taken in dairy calf raising.
12. Comprehend breeds and breeding programs appropriate for dairy cattle.

Course Outline

I. The Dairy Industry

A. History
B. Milk - Foundation of Good Nutrition
C. Dairy Industry - U.S.
D. Importance of Dairy Industry

II. Breeds of Dairy Cattle

A. Characteristics of Dairy breeds
B. Milk and Butter Fat Production Records
C. Programs of Registry

III. Establishing the Herd: Selecting and Judging

A. Purebred Business
B. Judging Dairy Cattle

IV. Fitting and Showing Dairy Cattle

A. Advantages and Disadvantages of Showing
B. Feeding for Show and Sale
C. Equipment for Show and Sale
D. Trimming and Grooming

V. Breeding Dairy Cattle

A. Genetics
B. Selection
C. Systems of Breeding
D. Physiology of Reproduction
E. Artificial Insemination

VI. Sterility and Delayed Breeding

A. Sterility
B. Poor Management and feeding
C. Physiology and Endocrine Glands
D. Inherited Abnormalities
E. Anatomical Defects
F. Bull Sterility

VII. Pasture and Green Chop

A. Classes of Pasture
B. Factors Affecting Pastures
C. Establishing Pastures
D. Management of Pastures

VIII. Hay

A. Importance
B. Hay Kind and Quality
C. Making Hay
D. Systems of Making Hay
E. Storing, Buying, and Selling Hay
F. Hay Feeding

IX. Silage

A. Ensilage Process
B. Advantages and Disadvantages
C. The Silo
D. Kinds of Silage
E. Harvesting Methods
F. How to Make Good Silage
G. Feeding Value
H. Haylage

X. Concentrates, Supplements, and Additives

A. Grains
B. Nitrogenous Feeds
C. Non-Protein-Nitrogen
D. By-Products
E. Minerals
F. Vitamins
G. Additives

XI. Fundamentals of Dairy Cattle Nutrition

A. Perspective of Nutrition
B. Physiology of Digestion
C. Nutritive Needs of Dairy Cattle

XII. Dairy Feeding Program

A. Evaluating and Buying feeds
B. Feeding Standards - Ration Formulation
C. Feeding Program

XIII. Dairy Cattle Behavior and Environment

A. Animal Behavior
B. Social Relations
C. Animal Environment
D. Pollution Control

XIV. Dairy Cattle Management

A. Dairy Management
B. Records
C. Manure

XV. Dairy Cattle Health, Disease Prevention and Parasite Control

A. Program for Health
B. Diseases of Dairy cattle
C. Parasites of Dairy Cattle
D. Disinfectants
E. Federal and State Regulatory Programs

XVI. Dairy Cattle Buildings and Equipment

A. Environmental Control
B. Plans and Specifications
C. Space Requirements of Buildings and Equipment for Dairy Cattle
D. Dairy Cattle equipment
E. Facilities
F. Fences

XVII. Dry Cows: Replacement Heifers: Dairy Beef

A. Dry Cows
B. Replacement Heifers
C. Dairy Beef

XVIII. Milk Secretion and Handling

A. Chemical Composition of Milk
B. Cow Secretion Mechanism
C. Milk Synthesis
D. Physiological Factors Regulating Milk Secretion

XIX. Marketing Dairy Products

A. Importance
B. Milk Marketing
C. Milk Manufacture
D. Products for Milk

XX. Business Aspects of Dairying

A. Types of Dairy business
B. Managing
C. Records
D. Budgets
E. Insurance

Food Technology 2313
Technology of Food Processing

Course Objectives

Upon completion of this course the student will be able to:

1. Identify on an area, a national, and global basis, processes that are a part of food processing.
2. Identify by color, smell, and feel food processing conditions.
3. Demonstrate knowledge of processing problems that affect human population.
4. Identify control measures for processing methodology used in foodstuffs.
5. Identify food additives and processes used in food preparation.
6. Identify modes of food preparation.
7. Identify food packaging technology.

Course Outline

I. What is Food?

- A. In Modern Society
- B. Composition
- C. Micro and Macro Ingredients
- D. Nutritive Value
- E. Industrial Food Processing and Health Food

II. Microorganisms in Food

- A. Forms of Life
- B. Microbial Growth and Spoilage
- C. Water Activity
- D. Food Poisoning
- E. Detection of Microorganisms
- F. Food Fermentation
- G. Role of Microorganisms in Human Nutrition

III. Food Industry

- A. Manufacturing and Preservation
- B. Food Processing
- C. Plant Organization
- D. Quality Control
- E. Government Regulations
- F. Material and Energy Balances
- G. Solubility and Concentration

IV. Processing Fruits and Vegetables

A. Characteristics
B. Photosynthesis and Respiration
C. Harvesting and Ripening
D. Storage
E. Preparation Processes
F. Blanching
G. Products
H. Jams and Jellies
I. Sugar
J. Nutritional Importance

V. Cereal Grains and Oil Seeds

A. Raw Materials
B. Cereal Grains
C. Baking Bread
D. Pastry
E. Milling Processes
F. Malting
G. Oil Seed Extraction
H. Margarine and Vegetable Oils
I. Oil Emulsions
J. Nutritional Aspects

VI. Milk and Dairy Products

A. Milk Production
B. Milk Composition
C. Milk Processing
D. Culturing
E. Cheese
F. Butter
G. Ice Cream
H. Concentrated and Dried Milk
I. Nutritive Value of Milk

VII. Processing of Meat, Poultry, and Fish

A. Sources
B. Composition
C. Muscle Nomenclature
D. Fresh Meat
E. Curing
F. Processing
G. Poultry
H. Fish and Seafood
I. Nutritive Value

VIII. Alcoholic and Non-Alcoholic Beverages

A. Products
B. Fermentation
C. Processing
D. Wine Products
E. Coffee and Tea
F. Soft Drinks
G. Nutritional

IX. Food Additives and Food Ingredients

A. Food Additives - What are they?
B. Functional Properties
C. Food Ingredients
D. Food Additives
E. Testing Food Additives
F. Chemical Preservatives
G. Food Contaminants
H. Labeling Requirements
I. Effects in Human Nutrition

X. The Process of Food Preservation

A. Causes and Prevention of Food Spoilage
B. Food Dehydration
C. Food Freezing
D. Heat Sterilization and Canning
E. Other Processes
F. Irradiation
G. Significance of Long-Term Preservation

XI. Food Packaging Technology

A. Purpose
B. Properties of Food Packaging Materials
C. Lamination
D. Effects on Food Stability
E. Modified Atmosphere Packaging
F. Role of Packaging in Distribution Chain

Sample Reference Materials

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Instructional Materials Service
Agriscience 241 References

Catalog Number	Title
CG241	Curriculum Guide for AgSc 241
4911	Teacher's Key for AgSc 241
8010	Meat Identification Charts (Beef, Pork, and Lamb)
8408	The Importance of Food Science Technology
8409	Trends in Food Production
8644-B	Poultry Carcass Evaluation
8820-A	Evaluating and Grading Carcasses and Wholesale Cuts
8823-C	Research in Animal and Food Science Technology
8653-A	Trends in World Populations
8653-B	Trends in Supply and Demand of Food Products
8654	Nutritive Value of Food Groups
8655-A	Inspection Standards for the Food Industry
8655-B	Control of Insects and Rodents in the Food Industry
8655-C	Chemicals for Sanitation in the Food Industry
8656	Preparing Livestock Carcasses for Market
8657	USDA Inspection of Beef, Pork, and Lamb
8658	Preparation of Processed Meats
8659-A	The Poultry Slaughtering Process
8659-B	Retail Cuts and Value Added Products of Poultry
8660-A	Classes and Qualities of Fish and Seafood
8660-B	Preparing Fish for Food
8660-C	Processing Seafood and Fabricating Specialty Fish Products
8661-A	Preserving Red Meat, Poultry, and Fish
8661-B	Packaging and Labeling Red Meat, Fish, and Poultry
8661-C	Refrigerating & Freezing Red Meat, Fish, and Poultry
8662	Identifying By-Products of the Meat Industry
8663-A	Handling and Storing of Eggs
8663-B	Grading Eggs
8663-C	Egg Marketing Process
8664-A	Preparing Milk for Processing
8664-B	Processing Milk and Dairy Products
8665-A	Processing Cultured Milk Products
8665-C	Processing Frozen Desserts from Milk
8665-D	Preparing Butter and Concentrated/Dried Milk Products
8666-A	Transporting, Receiving and Storing Fruits, Vegetables and Nuts
8666-B	Classifying and Grading Fruits, Vegetables, and Nuts
8666-C	Trimming, Washing, Waxing, Peeling, and Blanching Fruits and Vegetables
8666-D	Mechanical and Chemical Preservation of Fruits and Vegetables
8666-E	Packaging and Storing Fruits and Vegetables
8667-A	The Food Marketing Process
8667-B	Pricing, Labeling and Displaying Food Products
8667-C	Maintaining Stock and Quality Control of Food Products
8667-D	Convenience Food in Consumer Preference
8714-A	Purpose and Importance of Marketing
8714-D	Types of Agricultural Markets

Instructional Materials Service
Agriscience 312 References

Catalog Number	Title
CG312	Curriculum for AgSc 312
4915	Teacher's Key for AgSc 312
8736-A	Self Concept
8736-B	Social Skills
8736-C	Professional Image
8737-A	Leaders and Leadership
8737-B	Leadership Styles
8738-A	Personal Leadership Potential
8738-B	Basic Human Needs
8738-C	Motivation and Influence
8738-D	Preparing Resumes and Applications
8739-A	Job Interviews
8739-B	Employer Expectations
8739-C	Work Related Ethics
8739-D	Working with Co-Workers
8740-A	Job Applicants
8740-B	Evaluation of Employees
8740-C	Complaints and Appeals
8740-D	Employee Obligations
8740-E	Business Related Ethics
8741-A	The Communication Process
8741-B	Barriers to Communication
8741-C	Written Communication
8741-D	Verbal Communication
8741-E	Non Verbal Communication
8741-F	Listening
8741-G	Working with Diverse Groups
8741-H	Group Discussions
8741-I	Successful Meetings
8741-J	Friends and Friendship
8742-A	Organizing Groups
8742-B	Program of Activities
8742-C	Decision Making
8742-D	Problem Solving
8742-E	Personal Goals
8742-F	Time Management

Dairy Science References

Instructional Materials Service
Texas A&M University
F.E. Box 2588
College Station, Texas 77843
(409) 845 - 6601

Catalog Number	Title
8402	Selecting Dairy Cattle
8396	Breeds of Dairy Cattle
8642-A	Livestock, Dairy, and Poultry Production
8664-A	Preparing Milk for Processing
8664-B	Processing Milk and Dairy Products
8665-A	Processing Cultured Milk Products
8665-C	Processing Frozen Deserts from Milk
8665-D	Preparing Butter and Concentrated/Dried Milk Products
0037	Milk Processing Plant Employee
0039	Dairy Farm Worker
0227	Science of Providing Milk for Mankind
0407	Linear Classification of Dairy Cattle - Manual
0408	Questions and Answers on Federal Milk Marketing Orders
0409	Judging and Scoring Milk and Cheese
0410	Sediment Standards for Milk and Milk Products
4002	Dairy Cattle Evaluation Handbook
4006	Feeding Dairy Cattle
4022	Artificial Insemination of Livestock
4028	The Cows Udder and How It Functions
4035	Dairy Foods Evaluation Handbook
5017	1980 Dairy Products Judging - Milker Parts (Slides)
5019	Breeds of Dairy Cattle (Slides)
5076	1979 State Dairy Judging - Jersey (Slides)
5077	1979 State Dairy Judging - Holstein (Slides)
5101	1982 Judging Dairy Cattle - Jersey (Slides)
5102	1982 Judging Dairy Cattle - Holstein (Slides)
5115	1984 Dairy Cattle Judging (Slides)
5119	1985 Linear Classification of Dairy Cattle (Slides)
9168	Apple - ID - The Dairy Cow (Computer Program)
9203	Apple II+E/C - Dairy Production and Related Review (Computer Program)
9555	Fitting Dairy Cattle (VHS Video)
9556	Showing Dairy Cattle (VHS Video)
9552	Judging Dairy Cows (VHS Video)
9553	Judging Dairy Heifers (VHS Video)
9554	Introduction to Dairy Judging and Oral Reasons (VHS Video)
9557	Dairy Judging, TAMU (VHS Video)
9586	Practice Dairy Judging I (VHS Video)
9587	Practice Dairy Judging II (VHS Video)

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Curriculum Publications Clearinghouse
Western Illinois University
Harrabin Hall 46
Macomb, Illinois 61455

V-124 V-Tech Catalog - Dairy Worker

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Hobar Publications
1234 Tiller Lane
St. Paul, Minnesota 55112
(612) 633 - 3170

Computer Programs

AP2 - AG110 II+,IIe,IIc	Dairy Production and Related Review
AP2 - AG110 - 3.5 IIGS	
IBM - AG110 IBM PC MS-DOS	
IBM - AG110 - 3.5 IBM PC	
TRS - AG110 TRS 80 III,4	
MAC - AG110	
IBM - AG114 IBM or Compatible	Dairy Ration Balancing
TRS - AG114 TRS 80 I,III,4 48K	
AP2 - AG118 II+,IIe,IIc	Milk and Milk Quality and Related Revie
AP2 - AG118 - 3.5 IIGS	
IBM - AG118 IBM PC MS-DOS	
IBM - AG118 - 3.5 IBM PC	
TRS - AG118 TRS 80 III,4	
MAC - AG118	
AP2 - AG100 II+,IIe,IIc,IIGS	Milk Let Down

Videos

15400678	Dairy Production and Management: Animal Acquisition/Reproduction
15400681	Dairy Production and Management: Herd Health/Husbandry
15400679	Dairy Production and Management: Lactation
15400680	Dairy Production and Management: Nutrition
15400682	Dairy Production and Management: Waste Management/Buildings and Equipment
15400859	Dairy Production and Management: Full Set of Above

Hobar Publications
1234 Tiller Lane
St. Paul, Minnesota 55112
(612) 633 - 3170

Texts and Other References

19527-1	Dairy Cattle Production
709818-9	Principles of Dairy Science
1678-7	Dairy Farm Management
F-517	Milking Cows and Controlling Mastitis

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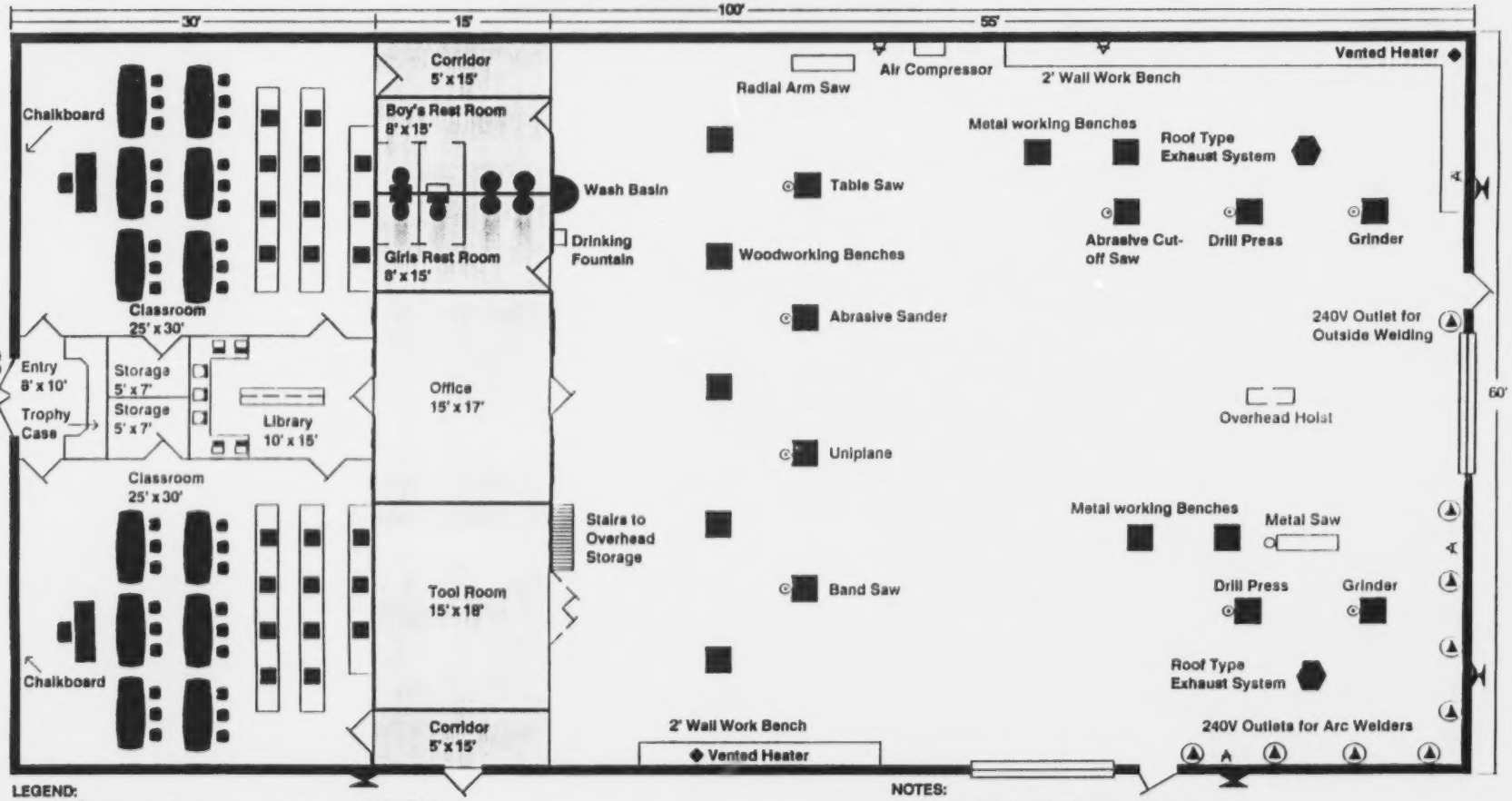
Teaching Aids Inc.
P.O. Box 1798
Costa Mesa, California 92628-7098

VT-107	Semen Collection and Processing (VHS Video)
VT-110	Artificial Insemination in Cattle
VT-109	Calving Problems and Procedures

Sample Line Drawing of Recommended Facilities

AGRISCIENCE CLASSROOM BUILDING AND SHOP FACILITIES



LEGEND:

- 240V Wall Outlets
- 240V Floor Outlets
- Compressed Air Outlets
- Water Faucet
- Glass Windows
- Wire Mesh
- Regular Door
- 12' x 12' Overhead Door

NOTES:

120V Outlets Each 10' Along Walls

Overhead Storage

Sample Tools and Equipment

Tools and Equipment

The following hand tool and equipment list specifies the recommended quantities of each tool needed to teach a class of twenty students, and this is the number that a school should purchase when initiating a 2+2 Agricultural Technologies Program for Dairy Products Management.

ITEM	RECOMMENDED QUANTITY	COST PER UNIT	TOTAL COST
Blacksmith anvil, steel face, 150 lbs.	2	$472.55	$945.10
Mowing machine anvil, guard & sickle	1	$109.95	$109.95
Scratch awl, 4"	8	$3.95	$31.60
Hand axe, single bit	2	$12.94	$25.88
Pry bar, 17", rolling head	1	$7.95	$7.95
Wrecking bar, gooseneck, 3/4" X 30"	2	$4.75	$9.50
Wrecking bar, gooseneck, 5/8" X 24"	2	$3.95	$7.90
Booster cable battery tool, h/duty	1	$20.99	$20.99
Sliding-T bevel, w/adjusting screw, 8" to 10" blade	5	$4.49	$22.45
Auger bit, 1/4" to 1" by 16ths (sets)	2	$93.20	$186.40
Countersink, power, straight shank	4	$5.99	$23.96
Countersink bit, rosehead, 3/4" x 5"	4	$9.15	$36.60
Electrician's bit, 1/2" bit	1	$14.69	$14.69
Expansion bit, 7/8" to 3"	2	$18.95	$37.90
Extension bit, 18"	1	$8.99	$8.99
Router bit, round shank, 1/4" to 3/4" (14 pieces/set)	1	$102.99	$102.99
Screwdriver bit, 1/4", 5/16", 3/8", 1/2" (ea.)	1	$1.99	$1.99
Spur bit, 1/4" to 3/4", round shank	1	$20.96	$20.96

ITEM	RECOMMENDED QUANTITY	COST PER UNIT	TOTAL COST
Set boards, demonstration boards for rural electrification lesson plans published by TEA, shopmade	1	$110.00	$110.00
Plumb bob, 12 oz.	1	$13.98	$13.98
Miter box, 4" X 24", w/14 pt. saw	1	$66.88	$66.88
Bit brace, reversible ratchet, 10"	6	$73.65	$441.90
Desk brush or bench duster, 2-1/2" x 10"	5	$7.60	$38.00
Paint brush, 3"	2	$2.99	$5.98
Parts brush, cleaning	5	$1.99	$9.95
Sash brush, 1/2", 3/4", 1", 2" (each)	2	$2.19	$4.38
Steel brush, 1" width X 10-12" overall length	10	$2.36	$23.60
Steel brush, rotary wire, 8"	2	$26.57	$53.14
Cabinet for germicidal safety glasses or goggles	1	$553.00	$553.00
Cabinet for combustible material	1	$631.00	$631.00
Inside calipers, spring 8"	1	$14.72	$14.72
Outside calipers, spring 8"	1	$14.72	$14.72
File card, w/brush	5	$7.10	$35.50
Tow chain, 3/8" x 16' with hooks	1	$78.95	$78.95
Cape chisel, 1/2"	2	$7.95	$15.90
Cape chisel, roundnose, 1/2"	2	$5.60	$11.20
Cold chisel, 1/4" to 1" by 8ths (sets)	2	$33.63	$67.26
Cold or flat chisel, 5/8" (each)	4	$5.09	$20.36
Cold or flat chisel, 1" (each)	4	$6.59	$26.36

SUPPLIES AND EQUIPMENT THAT MAY BE NEEDED FOR TEACHING THE 2+2+2 AGRISCIENCE TECHNOLOGY PROGRAM IN DAIRY PRODUCTS MANAGEMENT

In addition to the tools and equipment previously listed, the supplies and equipment listed below are necessary to develop skills and competencies needed by students.

1	Tattoo Set
4	Cattle-weighing Tapes
1	Balling Gun
2-3	Gallon pressure sprayers
4	Vaccinating Syringes and Assorted Needles (2) 50 cc Syringe Capacity and (2) 10 cc Capacity
2	Dose Syringes 5-10 oz. size
1	Veterinary Thermometer
1	Trocar with Cannula
4	Castrating Knives
100'	Manila Rope-1/2"
4	Hoof Trimmers
2	Emasculators
1	Burdizzo, Medium Size
1	Electric Clipper with Shearing Head
1	Hand Clipper
6	Pair rubber gloves
1	Keystone Dehorner
1	Calf Dehorner
1	Electric Dehorner
1	Chemical Dehorner
1	Dehorning Saw
1	Bull Ringer
1	Set of insect and parasite mounts
2	Livestock Show Boxes
2	Curry Combs
2	Cattle Brushes
1	Dissecting set
1	Surgical scissors
1	Soil Auger, 2" Bit, 40" Shank
1	Soil Testing Kit Including: Nitrogen Tester, Phosphate Tester, Potash Tester, pH Tester, Test Tubes, Reagents, and Filters
1	Plant Tissue Testing Kit
1-5	Bostrum No. 2 Farm Level with Tripods and Targets
1	Farm Level, Target, and Rod
1	Chain Tape, 100'
1	Set of Samples of Good Seed for Each Crop of Economic Importance in the Community
4	Insect Killing Jars
1	Soil Thermometer

ADDITIONAL DAIRY TOOLS AND EQUIPMENT - CONTINUED

1	Set of Grass and Legume Mounts
1	Soil Profile - Homemade of Typical Soil
1	Set of Fertilizer Samples
1	Set of Topsoil Samples
1	Specimen of Each Crop Plant from Rich and Poor Soil
1	Set of Samples of Soil-Building Crop Seed, Such as Legumes
1	Set of Legume Innoculants
1	Rain Gauge
1	Dust gun, eight pound capacity
2	Respirators
1	Set of classes and grades of feed, seed, and fiber products of economic importance in the community
1	Antibiotic Test Kit
	Teat Cups - Various
	Claws - Various Models
	Inflations - Various Models
1	Portable Milking Machine
1	Subscription - Hoard's Dairyman
1	Subscription - Dairyman's Digest

Visual Aids Equipment:

16mm movie projector
35 mm film strip - slide projector
Nonreflective screen for overhead projector
Reflective screen for movie projector
35mm camera
Video tape equipment - recording and playing
Computers (8)
Overhead projector
Video camcorder

Sample Competency Profile

COMPETENCY PROFILE

Secondary School _____ Postsecondary School _____

Agriculture 2+2 Program Area - Dairy Products Management Career Goal _____

Name _____ Social Security Number _____ Age _____

Address _____ Date of Birth _____

Phone Number _____ Sex _____ Racial/Ethnic Designation _____

Parent's Name _____ Phone Number _____

Secondary Agriculture Courses Completed

Name of Course	Date Completed Month	Day	Year
AGSC 101 Introduction to World Agricultural Science and Technology			
AGSC 102 Applied Agricultural Science and Technology			
AGSC 221 Introduction to Agricultural Mechanics			
AGSC 231 Animal and Plant Production			
AGSC 311 Agribusiness Management and Marketing			
AGSC 312 Personal Skill Development in Agriculture			
AGSC 321 Agricultural Structures Technology			
AGSC 323 Agricultural Power Technology			
AGSC 332 Animal Science			
AGSC 333 Plant and Soil Science			
AGSC 241 Food Technology (Optional)			
AGSC 222 Home Maintenance and Improvement (Optional)			

Postsecondary Agriculture Courses Completed

Name Of Course	Date Completed Month	Day	Year
AGRI 1303 Animal Nutrition and Feeding			
AGRI 1304 Animal and Poultry Health Management			
AGRI 1350 Computers in Agriculture			
AGRI 1443 Agricultural Economics			
AGRI 2308 Cooperative Education			
AGRI 2363 Forage and Pasture Crops			
AGRI 2371 Dairy Science			
AGRI 2372 Dairy Management			
AGRI 2406 Genetics			
AGRI 2483 Reproductive Physiology			
FOOD 2313 Technology of Food Processing			
FOOD 2400 Introductory Food Science			

COMMENTS: _____

Directions: **Evaluate the student using the rating scale below. Check the appropriate number to indicate the degree of competency. The rating for each of the tasks should reflect job readiness.**

Rating Scale:
4 Skilled - can work independently with no supervision
3 Moderately Skilled - can perform job completely with limited supervision
2 Limited Skill - requires instruction and close supervision
1 No Exposure - no experience or knowledge in this area

A. MILKING,SANITIZING,AND MAINTAINING THE EQUIPMENT

4	3	2	1	
				1. Sanitize the milking system
				2. Assemble milking equipment
				3. Prep the cow for milking
				4. Milk the Cow with the Milking Machine
				5. Monitor feed and milk cooling equipment
				6. Clean the milking system
				7. Maintain milking system

B. MAINTAINING DAIRY HERD HEALTH

4	3	2	1	
				1. Identify ailments in order to obtain timely treatment
				2. Administer medication and vaccinations
				3. Sterilize tools and equipment
				4. Store medicines/chemicals
				5. Control parasites
				6. Take an animal's temperature
				7. Perform in-barn mastitis test
				8. Keep health records on dairy animals
				9. Inventory medical and chemical supplies
				10. Test milk for antibiotics

C. BREEDING

4	3	2	1	
				1. Examine & treat reproductive system for breeding
				2. Detect heat
				3. Artificially inseminate cows and heifers
				4. Handmate cows and heifers
				5. Manage Sires
				6. Record breeding data
				7. Store semen and maintain breeding supplies
				8. Pregnancy test bred cows and heifers

D. HANDLING AND CARING FOR MILKING HERDS ACCORDING TO PRODUCTION

4	3	2	1	
				1. Check udder health
				2. Monitor eating and milk production
				3. Sort cows into herds
				4. Segregate incompatible animals
				5. Dry off cows

E. HANDLING AND CARING FOR THE DRY HERD

4	3	2	1	
				1. Manage dry cows
				2. Assist with calving
				3. Produce healthy newborn calves
				4. Remove extra teats

F. HANDLING AND CARING FOR THE REPLACEMENT HERD

4	3	2	1	
				1. Manage baby calves 0-8 weeks
				2. Manage calves 200-500 pounds
				3. Identify animals
				4. Dehorn animals

G. FORMULATING AND FEEDING RATIONS

4	3	2	1	
				1. Identify & regulate access to feedstuffs causing off-flavored milk
				2. Classify feedstuffs to nutritive value
				3. Calculate nutritional requirements for animals
				4. Mix & test feed ingredients to meet animal & ration requirements
				5. Weigh animals
				6. Feed animals
				7. Clean feed and water troughs
				8. Provide adequate water

H. PRODUCING FORAGES

4	3	2	1	
				1. Design and follow a soil conservation plan
				2. Prepare the seedbed
				3. Plant forages
				4. Control Diseases
				5. Control Pests
				6. Control Unwanted Plants
				7. Determine harvest time and harvest forages
				8. Store forages

I. OPERATING AND MAINTAINING NON-MILKING EQUIPMENT AND TOOLS

4	3	2	1	
				1. Remove or add ballast weights to tractors
				2. Attach farm equipment to the drawbar
				3. Operate equipment
				4. Store equipment
				5. Perform seasonal preventative maintenance
				6. Perform daily preventative maintenance on equipment
				7. Replace universal joints
				8. Maintain tires
				9. Bleed diesel fuel systems
				10. Change fuel filters
				11. Change oil and oil filter
				12. Flush and clean radiator
				13. Replace thermostats
				14. Replace radiator hoses
				15. Install V-belts on pulleys
				16. Install and adjust pulleys on motors
				17. Install electric motor
				18. Reverse electric motor
				19. Service electric motors
				20. Install and adjust roller chains
				21. Install engine batteries
				22. Service engine batteries
				23. Service wheel or in-line bearings
				24. Maintain tools
				25. Adjust safety shields
				26. Calibrate equipment

J. MARKETING PRODUCTS AND ANIMALS

4	3	2	1	
				1. Market dairy animals/products
				2. Transport animals
				3. Verify production records

K. HANDLING AND DISPOSING OF ANIMAL WASTE

4	3	2	1	
				1. Manage and remove solid and liquid waste
				2. Apply wastes to fields

L. ASSIST IN SELECTING BREEDING ANIMALS

4	3	2	1	
				1. Cull animals
				2. Select foundation stock
				3. Select purchased and self-raised replacement stock
				4. Select sires

M. MAINTAINING BUILDINGS AND STRUCTURES

4	3	2	1	
				1. Construct and install doors
				2. Hang sliding doors
				3. Hang hinged doors
				4. Paint wood surfaces
				5. Paint metal surfaces
				6. Apply creosote or other wood preservatives
				7. Patch roofs
				8. Install window panes
				9. Weld metal using arc welder
				10. Weld metal using oxy-acetylene unit
				11. Cut metal using oxy-acetylene unit
				12. Construct and maintain wooden fence
				13. Construct and maintain wire fence
				14. Construct and maintain electric fence
				15. Construct and maintain gates
				16. Hang Gates
				17. Wire simple electric circuits
				18. Connect electric switch
				19. Connect lighting fixture
				20. Attach plug and receptacle to electrical drop cord
				21. Replace fuses
				22. Reset circuit breakers
				23. Maintain a water system
				24. Pour concrete floor
				25. Construct block walls
				26. Extinguish fires
				27. Maintain ventilation equipment in dairy barns
				28. Paint buildings

N. MANAGING HAZARDOUS MATERIALS

4	3	2	1	
				1. Storing hazardous materials
				2. Using hazardous materials
				3. Disposing of hazardous materials
				4. Managing dioxins

O. MANAGING THE BUSINESS

4	3	2	1	
				1. Maintain health records on dairy animals
				2. Inventory supplies
				3. Maintain animal production records
				4. Maintain pedigree records
				5. Maintain equipment records
				6. Maintain forage production records

P. PREPARING FOR OWNERSHIP

4	3	2	1	
				1. Calculate Interest Costs
				2. Formulate Feasible Repayment Schedule
				3. Prepare a Cash Flow Budget for the Dairy Enterprise
				4. Develop and negotiate a credit plan for the farm business
				5. Calculate and record assets
				6. Calculate and record liabilities
				7. Calculate and record expenses
				8. Calculate net income
				9. Calculate amount of life insurance needed
				10. Calculate and record depreciation
				11. Calculate and record net worth of farm businesses
				12. Fill out income tax form: income or loss
				13. Fill out federal income tax capital gains or loss
				14. Fill out federal income tax investment credit schedule
				15. Fill out federal income tax FICA schedule
				16. Complete federal income tax form 1040
				17. Hire workers
				18. Dismiss workers
				19. Develop a plan for amount of labor needed
				20. Develop and assign work schedules
				21. Comply with employers legal requirements
				22. Train employees
				23. Develop written work agreements
				24. Evaluate work performance
				25. Develop production goals
				26. Comply with industry production standards
				27. Analyze trends in dairy product demand
				28. Contract for professional management services
				29. Develop plan for bestowing the estate
				30. Calculate and record labor management income

Q. STARTING UP HIGH-TEMPERATURE, SHORT-TIME PASTEURIZATION PROCESS

4	3	2	1

1. Inspect equipment prior to start-up
2. Adjust equipment for start-up
3. Prepare data recording equipment
4. Start up high-temperature, short-time pasteurization

R. PROCESSING HIGH-TEMPERATURE, SHORT-TIME PASTEURIZATION

4	3	2	1

1. Monitor pasteurization process
2. Adjust equipment for high-temperature, short-time processing
3. Record high-temperature, short-time processing data
4. Put product into storage tank

S. PERFORMING PRODUCT-TO-PRODUCT CHANGEOVER

4	3	2	1

1. Prepare lines and valves to bring new product to balance tank
2. Adjust equipment for product changeover
3. Complete product changeover process

T. PERFORMING PRODUCT CHANGEOVER REQUIRING FLUSH-OUT

4	3	2	1

1. Operate lines following established sequence
2. Set recording data equipment for changeover/flush-out
3. Perform flush-out procedures
4. Inspect equipment for proper operation
5. Complete product changeover process

U. SHUTTING DOWN HIGH-TEMPERATURE, SHORT-TIME PASTEURIZATION

4	3	2	1

1. Prepare high-temperature, short-time for shut-down
2. Shut down high-temperature, short-time system
3. Inspect recording data equipment

V. CLEANING THE HIGH-TEMPERATURE, SHORT-TIME PASTEURIZER

4	3	2	1

1. Inspect and adjust equipment and lines for cleaning
2. Perform cleaning procedures
3. Inspect equipment

W. APPLYING SAFETY PRACTICES

4	3	2	1

1. Comply with shop and equipment safety rules
2. Apply basic emergency first aid techniques
3. Complete accident report
4. Inspect work area and equipment for safe working
5. Use fire extinguisher
6. Correct safety hazards
7. Demonstrate cardiopulmonary resuscitation (CPR)
8. Comply with safety requirements for working around automated systems
9. Participate in safety training program

Sample Articulation Agreement

AGRICULTURAL OCCUPATIONS 2+2+2 PROGRAM

ARTICULATION AGREEMENT

PURPOSE

1. To eliminate duplication of effort between area secondary and postsecondary educational institutions in the delivery of agriscience courses.

2. To optimize student enrichment by providing coordinated curriculum to insure a continuous learning path, beginning at the secondary level and continuing to the postsecondary level.

3. To assure that students are adequately equipped with the necessary academic and vocational skills to gain and hold employment upon graduation from both secondary and postsecondary levels.

AGREEMENT

1. Secondary institutions which are a party to this agreement hereby agree to:

a. Evaluate and recruit students who have, in their opinion, necessary qualifications to successfully complete the Agricultural Occupations 2+2 or 2+2+2 Articulated Program.

b. Offer and maintain for the duration of this agreement the agriscience courses designated as a part of the Agriculture 2+2+2 Articulated Program or a series of courses containing the same competencies.

c. Maintain necessary records to track and evaluate individual student's progress of required agriscience competencies as contained in the Agricultural Occupations 2+2+2 Articulated Program. Such records will be forwarded to the postsecondary institution upon request.

2. The postsecondary institutions which are a part of this agreement hereby agree to:

a. Assist secondary institutions which are a party to this agreement in evaluating and recruiting students.

b. Offer and maintain for the duration of this agreement Applied and Associate Degree curriculum and resources as specified in the Agricultural Occupations 2+2 and 2+2+2 Articulated Program. No student will be allowed to enter the associate degree program without having first successfully completed the competencies required in the secondary portion of the Agricultural Occupations 2+2+2 Articulated Program.

AGRICULTURAL OCCUPATIONS 2+2+2 PROGRAM

ARTICULATION AGREEMENT
Continued

c. Provide an adequately trained faculty to administer and teach the Agricultural Occupations Applied and Associate Degree curriculum.

d. Provide assessment of students upon entry to the postsecondary institution(students must score 80% or greater on materials covered in secondary program) and counsel students regarding the Applied vs the Associate Degree Programs.

e. Continue student records provided by secondary institutions; maintain adequate records during applied or associate degree program; and track student progress through at least one year of employment and provide to employers upon request.

REVIEW AND CHANGE PROCESS

At the end of one year from the date of this agreement, a review of the Articulation Agreement of the Agricultural Occupations 2+2+2 Articulated Program will be conducted. All superintendents, principals, counselors, vocational administrators, instructors from secondary schools, administrators and instructors from postsecondary schools, and industry representatives will be invited to provide input for review and revision.

PROVISION FOR IMPLEMENTATION/TERMINATION

This agreement will become effective upon approval by the President of _____ College and the Superintendent of _____ Independent School District. Upon implementation, this agreement will continue on an annual basis until one of the parties petitions the other party to end the agreement.

Such petition to end the agreement (1) must be submitted one year in advance of the intent to terminate; (2) must be submitted in writing signed by the college president or school superintendent making the petition; and (3) must be delivered to the second party of the agreement. Delivery of the intent to terminate will constitute formal notification and will serve as grounds for termination one year following the date of delivery.

_____	_____
President	Superintendent
_____ College	_____ ISD
_____ 1991	_____ 1991